NOVEMBER 1959

IN THIS ISSUE (over 60,000 copies circulated):

No loss of steam at interruptible rates.....**page 17**
Put coal dust in boiler — not in air.....**page 24**
Why *welded* feedwater heaters.....**page 26**

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Plant and Power Services Engineer

a lesson in fuel cost evaluation

University of Kentucky learned what can happen when improper considerations creep into fuel cost study for a new boiler plant

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Some Straight Talk On Steam Trap Capacity

...or pulling away the curtain of confusion that surrounds steam trap capacity ratings.

Unfortunately, for the steam trap buyer, the subject of steam trap capacity has become cloudy and confused by a landslide of claims, counter-claims and inconsistent "standards" for measurement. So let's take a cold hard look at this subject so vital to the efficient operation of your plant.

What Determines Steam Trap Capacity?

There are three factors that determine the capacity of a steam trap:

1. The area of the orifice.
2. The density of the condensate.
3. The pressure differential across the trap.

Let's take a closer look at each of these:

Area of orifice is usually specified by the trap manufacturer or can be calculated from the diameter. Nothing complicated here.

Density of condensate depends on temperature. A cubic foot of cold water weighs 62.4 lbs. At 250° F. or 15 psi, it weighs less than 59 lbs. This is important. Don't overlook it.

Pressure differential across the trap is most significant. And it is complicated by the many factors that affect it, such as:

1. Pressure drop between unit drained and the trap when the trap valve is open.
2. Distance the trap valve is moved from the valve seat.
3. Back pressure on the trap with orifice closed; i.e., return header pressure.
4. Increase in back pressure produced by condensate and flash steam flowing in the discharge line. This in turn is affected by the diameter and length of the discharge line, plus friction caused by valves and fittings.

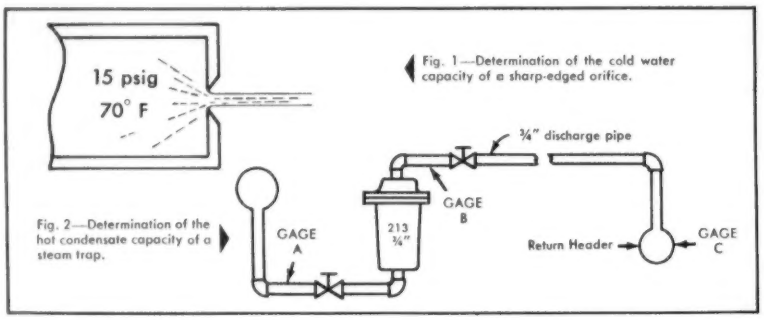


Fig. 1—Determination of the cold water capacity of a sharp-edged orifice.

Fig. 2—Determination of the hot condensate capacity of a steam trap.

Orifice Capacity Vs. Steam Trap Capacity

Figure 1 shows a ½" diameter sharp-edged orifice at the end of a pipe filled with cold water at 15 lbs. pressure. The capacity of this orifice, using a .61 coefficient of flow would be 8,800 lbs. per hr. Now, would this ½" orifice if used in a ¾" steam trap installed as shown in Figure 2 provide the trap with a continuous discharge capacity of 8,800 lbs. of hot condensate per hour? The answer is "no". And here are some of the reasons why:

Density of condensate. As pointed out above, cold water weighs 62.4 lbs. per cu. ft. At 15 lbs. pressure and 250° F. water weighs less than 59 lbs. per cu. ft. This difference in density alone reduces the lbs. per hour capacity of the orifice by over 5%.

Pressure differential across the trap. With the trap valve closed we have a static pressure differential of 15 psi. The trap valve must be able to open against this pressure. However, this is not the pressure differential that will determine the capacity of the trap valve.

The ¾" discharge line will be full of a mixture of flash steam and condensate. To keep this mixture flowing from the trap outlet to the return line requires a pressure differential. In actual capacity tests run as shown in Figure 2 Gage B at the trap outlet registered 11 lbs. back pressure. Thus the true pressure differential across the trap was about 4 lbs. Under these conditions the measured capacity of the trap was 4,340 lbs/hr. or just about half of the capacity of the ½" orifice for cold water.

How Armstrong Determines Capacity Ratings

Armstrong trap capacity ratings are based on hundreds of tests under actual operating conditions. In these tests, the condensate used was at the steam temperature corresponding to the test pressure. Thus, the capacities determined take into account the pressure drop that occurs when the trap orifice opens and the choking effect and back pressure of the flash steam. Actual installation hook-ups were used so that pipe friction in both inlet and discharge lines as well was reflected in the results.

Let's go back to the example cited above and in Figure 2. The trap referred to is an Armstrong No. 213. While it did test out at 4,340 lbs. per hour for a static pressure differential of 15 psi, it is rated in the catalog at only 3900 lbs. per hour for this pressure—just to be on the safe side.

For the trap buyer, this means that Armstrong Steam Trap capacities are based on handling condensate at steam temperature for the stated static steam pressure differential under actual working conditions.

Capacity ratings which don't take into account all of the variables will be misleading and may lead to the selection of undersized traps. So whenever you specify or buy traps be sure that the capacity ratings you work from are realistic. One way to be sure is to select Armstrong Traps with *guaranteed* capacity ratings.

* * *

Additional information on trap capacity ratings, plus data on how to correctly size, install and maintain steam traps for any pressure, any temperature and any load, are presented in the 48-page Armstrong Steam Trap Book. Ask your local Armstrong Representative for a copy or write:

Armstrong Machine Works
8206 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

"See our catalog in Sweet's Plant Engineering File"

Circle 9626 inside back cover.

THAT'S INTERESTING

Chrysler cars get rust-proofing

Longer vehicle life, less upkeep cost, all-round year-in-year-out better appearance is what Chrysler Corporation is aiming at for 1960 with a new multi-million dollar rust-proofing process.

An electronically controlled system of cleaning and drying, heating and cooling, rinsing, priming and painting gives full protection to every part of the auto body.

Each body will be subjected to nine different temperature changes, three metal cleaning baths, seven anti-corrosion dips, seven spraying operations and seven external paint finishing operations.

June in January

A three-year basic research project that may give new knowledge about how man can control the weather was the purpose of a $115,000 grant given to the University of Texas by the National Science Foundation.

An immediate by-product of the research will be a more effective use of radar by meteorologists in hydrological and flood forecasting, and especially in determining the total amounts of rain expected to fall over large areas.

The grant will support a study of the radar-reflecting properties of rain and other forms of precipitation. The new project is "an outgrowth of a number of earlier EERL research programs in which very short-length radio waves were used to study the extent to which rain would absorb and reflect radio energy."

Such information will give invaluable data on the mechanisms which govern the formation of rain and other kinds of precipitation.

Oct. 30-Nov. 1: American Society of Refrigerating Engineers Semi-Annual Meeting; Traymore Hotel, Atlantic City, N.J.

Oct. 30-Nov. 2: Refrigeration Service Engineers Society; Annual Meeting; Atlantic City, N.J.

Nov. 2-5: 11th Annual Exposition of Air Conditoning and Refrigeration Industry; Convention Hall, Atlantic City, N.J.

Nov. 2-5: National Metal Exposition; Morrison Hotel, Chicago, Illinois.

Nov. 4-6: American Nuclear Society Winter Meeting; Sheraton Park Hotel, Washington, D.C.

Nov. 5-6: Eighth Annual Instrumentation Conference; Louisiana Polytechnic Institute, Ruston, La.

Nov. 9-13: National Electrical Manufacturers Association Annual Meeting; Traymore Hotel, Atlantic City, N.J.

Nov. 23-24: Instrument Society of America Symposium; Ben Franklin Hotel, Philadelphia, Pa.

Nov. 29-Dec. 4: Exposition of Chemical Industries; New York Coliseum, New York, N.Y.

Dec. 1-4: National Warm Air Heating and Air Conditioning Committee Meetings and Annual Convention; Chase Hotel, St. Louis, Mo.

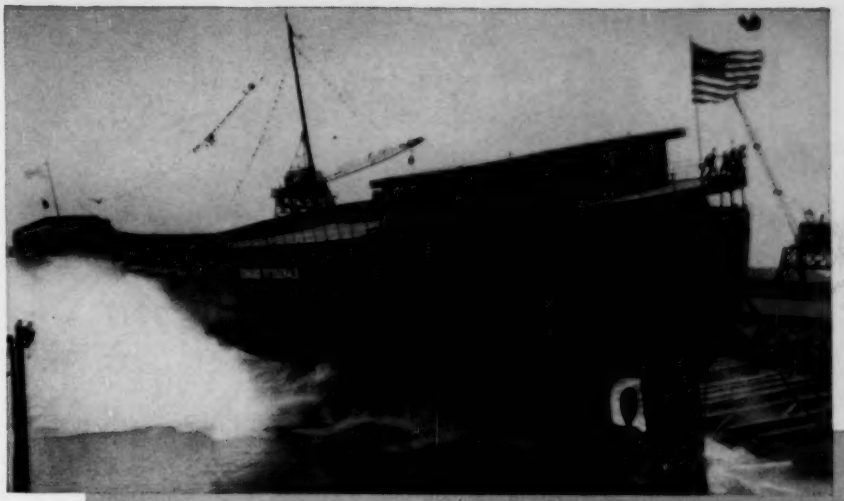
Jan. 25-28: Plant Management & Engineering Show; Convention Hall, Philadelphia, Pa.

Feb. 1-4: American Society of Heating and Air Conditioning Engineers; Dallas, Tex.

Feb. 14-18: National Association of Corrosion Engineers; Memorial Auditorium, Dallas, Tex.

Mar. 23-26: Electrical Industry Show and Lighting Exposition; Shrine Exposition Hall, Los Angeles, Calif.

Mar. 6-9: National Electrical Industries Show; New York Coliseum, New York, N.Y.



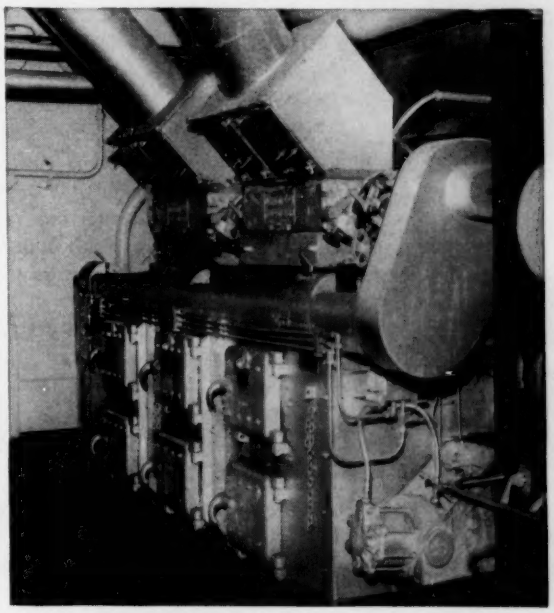
Launching of the Edmund Fitzgerald—largest ship on the Great Lakes. Length 729 ft., beam 75 ft., depth 39 ft., Ore cargo capacity 26,000 gross tons. Owner, The Northwestern Mutual Life Insurance Co. Builder, Great Lakes Engineering Works, at its River Rouge, Mich., yard. Charterer, Columbia Transportation Division of Oglebay Norton Co.

(Wide World Photo)

SS EDMUND FITZGERALD . . .

the 61st Ship equipped with

DETROIT STOKERS



One of 2 Detroit RotoStokers Type CC firing 2 Combustion Engineering Co. bent tube marine boilers in the Fitzgerald. Each boiler is rated at 32,750 pounds steam per hour MCR—36,000 pounds per hour peak. Operating pressure is 470 psig. Total steam temperature is 755°F. Design is for 12,350 BTU bituminous coal with 11.9% ash.

The Str. Edmund Fitzgerald, with Detroit RotoStokers Type CC (continuous cleaning), is the 61st ship in 10 of the Great Lakes fleets to be equipped with Detroit Stokers.

These ships burn coal because it is the most economical fuel . . . burn it on Detroit Stokers because of their high efficiency and dependable operation.

Dependability is important anywhere . . . doubly so on ships where failure at a critical moment would be serious. Stoker efficiency is a first concern of cost conscious ships' crews who compete for operating economy records.

An additional advantage in ship as well as other installations is the fact that the Detroit RotoStoker and the RotoStoker CC can be installed for firing-floor ash discharge if desired, avoiding the use of basement or hold space for ash bunkers.

Efficiency, flexibility, low upkeep and high availability of Detroit Stokers is well known wherever coal is burned.

For the same kind of superior stoker service and economy that was chosen for this giant steamship, let us survey your plant and give you recommendations—without obligation.

DETROIT STOKER COMPANY

MAIN OFFICE AND WORKS • MONROE, MICHIGAN

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Circle 9627 inside back cover.

Specifically speaking about this issue

Whenever we are asked "What kind of a magazine is PLANT and POWER SERVICES ENGINEER?" we come back with "It's a magazine for 'ideaists'." Immediately, of course, we are asked, "Don't you mean 'ideal*ists*'?" — to which we vehemently exclaim "No!"

QUICK FUEL CHANGE

According to Webster (one of our basic sources of information) an "idealist" is "one whose conduct is influenced more by ideals than by practical considerations; hence, a dreamer." Since Webster does not give us a definition of "ideaist" (as we more-or-less coined the word), we can, by a reasoning process, define it as "one whose conduct is influenced more by practical considerations (ideas) than by ideals; hence, an idea man."

NOISE CUTTER

Getting back to our original statement, we then further explain that every issue of this magazine is designed for the man who is looking for ideas — not ideals. That is why plant and power services engineers (whom we know to be "ideaists") will find our stories to be of the down-to-earth type — full of ideas on how they can make their plant and power services a much more efficient operation.

AN EDUCATION

That's why you won't find our articles full of ideals — topics that are up in the stratosphere and that deal with "less practical considerations."

Take our lead-off article, for example. Here, you can get an idea on how to set up a boiler installation to take advantage of "interruptible" gas rates and, at the same time, not worry about loss of steam when the gas supply is cut off. The secret lies with the burner unit that the Stuart Company installed and which is described in the story by West Coast Editor, Karl Robe, on page 17.

If you have a noisy gas turbine, you will get some ideas from an installation in Venezuela on how to control noise and simultaneously do a good job of conserving heat in both the air inlet and exhaust ducts. Not only does the story on page 18 describe the insulation used, but also goes into detail on how it was installed.

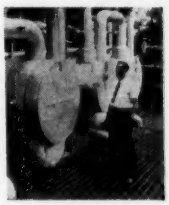
CORROSION STOPPER

An idea of what can happen when improper cost studies are used to select the fuel for a new steam plant can be obtained from the story on what *did* happen at the University of Kentucky when it planned the boiler plant for its new Medical School.

NO COAL DUST

Also, you might get an idea on how to beat that corrosion problem which has been troubling you lately from the story on page 23. Although this story deals with water treatment equipment, the method can be applied to many other situations.

If you have coal dust, you'll like the way American Maize keeps coal dust out of the air and puts it to work in its boilers. What's more, this method is simpler and more economical to install and use than you would imagine. See page 24.



WELDING DOES IT

Have you ever thought of using welded feedwater heaters? Chad O'Conner did, and he tells you about his trouble-free experiences with them (page 26).

George V. Michael

BUSINESS PUBLICATIONS AUDIT of circulation, Inc. BPA

NBP NATIONAL BUSINESS PUBLICATIONS, INC.

Published Monthly by
PUTMAN PUBLISHING COMPANY
PUTMAN PUBLISHING BUILDING
111 E. DELAWARE PLACE, CHICAGO 11, ILLINOIS
WHITEWALL 4-6141

Also publishers of
CHEMICAL PROCESSING,
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FOOD BUSINESS

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NOVEMBER, 1959
VOLUME 1 NUMBER 7
(as Plant and Power Services Engineer)

Plant and Power Services Engineer

Serving the key engineers and consultants who are responsible for both plant services and power services throughout all industry, in utilities and large public service installations and buildings.

IN THIS ISSUE

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23 Protects water treatment equipment against corrosion
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26 Why WELDED feedwater heaters? — C. O'CONNOR
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30 Modernizes boiler installation with minor changes
31 Monitors silica in make-up water automatically and continuously
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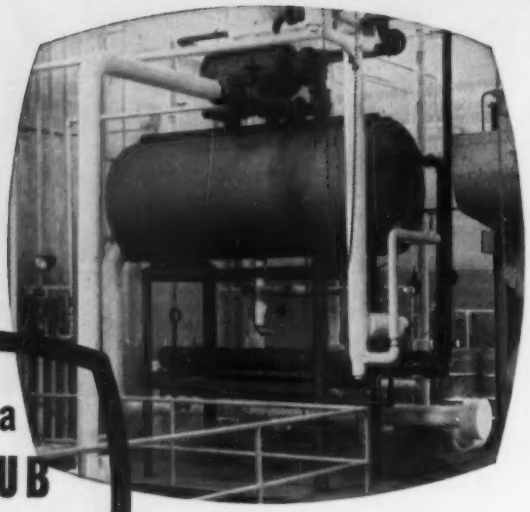

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Circle 9628 inside back cover.

Jet engine to supply gas turbine power

A major advance in the industrial gas turbine field has been announced jointly by Cooper-Bessemer and Pratt & Whitney Aircraft.

It is based on a modified Pratt & Whitney Aircraft J-57 jet engine, which will drive a Cooper-Bessemer designed gas turbine, thus converting the jet's massive thrust into commercially usable horsepower. An experimental prototype of the complete gas turbine unit is under construction at the Mount Vernon, Ohio, plant of Cooper-Bessemer.

The J-57 is the power plant for America's jet commercial fleets and advanced military aircraft. By modification of the J-57 engine, however, hot compressed gases that normally provide enormous thrust will be harnessed by the Cooper-Bessemer gas turbine for conversion into rotative horsepower.

An initial use of the new gas turbine engine will be for transmitting natural gas through cross-country pipeline systems. For this service, the new turbine is coupled to a centrifugal compressor.

The J-57, which normally burns conventional jet fuels was converted to burn natural gas taken directly from the main pipeline on which the unit is pumping gas. The first turbine, a 10,500 hp unit, is now under construction and will be ready for field installation early in 1960.

NEMA standards publication

The following NEMA Standards Publications have been printed, and copies are available for immediate distribution:

Revised Industrial Control book covers the rating, test and performance, manufacturing and application of the following types of control equipment:

1) Control devices — contactors, magnetic control relays, resistors, autotransformers and reactors, static switching control devices, pushbuttons, motor-starting switches, pneumatic time delay relays, and brakes.

2) AC general-purpose controllers — for induction and synchronous motors, control centers, low-voltage Class C and high-voltage Class E high-interrupting-capacity controllers.

3) DC general-purpose constant-voltage controllers — DC general-purpose, machine-tool Class B, and electronic DC shunt motor controllers.

4) Definite-purpose controllers — steel-mill machinery, cab-operated and floor-operated cranes, mine hoists, refrigeration and air-conditioning compressor units, oil field controllers, and graphic arts machinery. Publication IC 1-1959 is $6.00 per copy.

Large Generating and Converting Apparatus booklet covers frequency and phase converters and large hydraulic-turbine-driven generators. Cost of LG 2-1959 is 30 cents per copy.

SG 8.1 deals with compression-type connectors and SG 8.2 deals with screw-type connectors. Information is given concerning sizes; electrical and mechanical ratings; secureness, temperature-rise and pull-out tests; identification; finish; and dimensions of terminal tangs. Price is 30 cents each per copy.

Book on gas-turbine power plants covers definitions, no-

menclature, rating and performance, accessories, preparation for shipment and installation, and weather protection. Cost for SM 30-1959 is $1.00 per copy.

Standard on Returnable Reel Dimensions for Wires and Cables covers returnable wood, wood and metal, and all-metal reels used in processing and shipping wire and cable. It establishes reel sizes designed to provide strength, holding capacity, and steps between sizes. Price for WC 20-1959 is 25 cents per copy.

Russia not in atomic power race

Russia is not engaged in a race with the United States or any other country in development of atomic power, James F. Davenport, executive vice president of Southern California Edison Company, said today in a report on his 10,000-mile trip through the Siberian area of the Soviet Union.

"Conventional steam plants enjoy top construction priority in the electrical field in Russia," Davenport told the Electrical Conference of the Petroleum Industry, holding its annual national convention in Long Beach.

"Second priority is given hydroelectric power construction — with atomic plants in third place."

The Edison executive explained that the Russians have a tremendous industrial expansion program to achieve before they can begin substantial increases in consumer goods and compete in world markets — which, of course, is the Soviet goal, ultimately.

"Consequently, they need huge blocks of power quickly, and they don't care how they get it — from steam, falling water, or the atom," Davenport declared.

"First priority goes to steam, because this is quicker and less costly to build and the Siberian area has enormous resources of coal."

Davenport estimated that the Russians are approximately ten years behind the United States in development of automation in power plants.

"This does not necessarily imply any lack of ability to catch up — only a later start," he added. "Most of their present technology has been expertly adapted — and this process doubtless will continue until the gap is closed, or at least substantially narrowed."

Davenport said he visited two large atomic power plants under construction — but that very little activity was observable at either one of these because conventional power projects enjoyed a higher priority on the labor supply.

Davenport, one of ten U.S. electric industry representatives on the Russian tour, said the Soviet Union's total power output at present is about one-third of our own.

Simplifies overcurrent relay selection

A new mathematical formula has been proposed by Allis-Chalmers engineers for overcurrent relay selection and coordination.

This formula — $I^n t = k$ — provides simple, straight line functions when plotted on double logarithmic paper. In the formula, "I" represents multiples of tap value current; "t" is time in suitable units; "k" is time scale index; and "n" is inversion index.

Static relays now available can be adjusted to change the slope of the time-current curve (inversion index) or the time to trip (time index) for coordinating any given circuit.

Much confusion can be eliminated in relay coordination by simply indicating values for the inversion index and time scale index of the relay being coordinated with other protective devices on the system.

CONCENTROL
PROVIDES
LOW COST, EFFECTIVE CONTROL of FOAM and BOILER WATER CARRY-OVER

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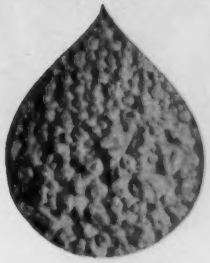
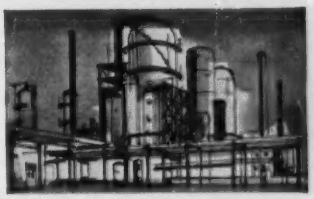


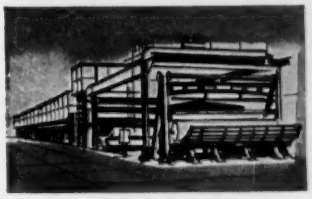
BEFORE: Foaming of highly alkaline solutions in glass test cylinder.

AFTER: Same solution after addition of 12 ppm of Bird-Archer Concentrol antifoam.

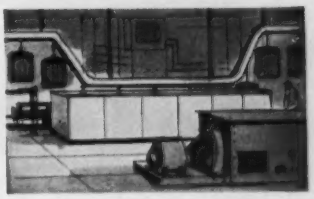
PROVED IN THE FIELD:

Concentrol eliminates foaming, maintains dissolved solids of 10,000 ppm with alkalinity in excess of 2,000 ppm in East Texas refinery.





Concentrol reduces blowdown rate from 15% to 5%, keeps steam quality high in paper mill using highly alkaline makeup water.



Concentrol eliminates boiler carry-over caused by high alkalinity for an automobile radiator manufacturer using a carbonate water that is Zeolite softened.

Concentrol is available in liquid, powder or briquette forms. Fast acting and resistant to hydrolysis or breakdown under normal boiler temperatures and pressures, it can be fed either continuously or in slugs to boilers. Many plants get the advantages of positive foam control *plus* boiler water sludge conditioning by using Concentrol in combination with organic sludge conditioning agents.

Let a Bird-Archer Water Treatment Engineer prove what Concentrol can do in your plant.
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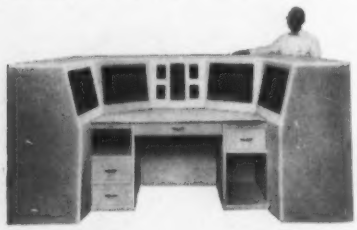
Request your copy of the new 40-page Kirk & Blum Sheet and Plate Fabrication Catalog. Better yet, send us your prints for prompt quotation.



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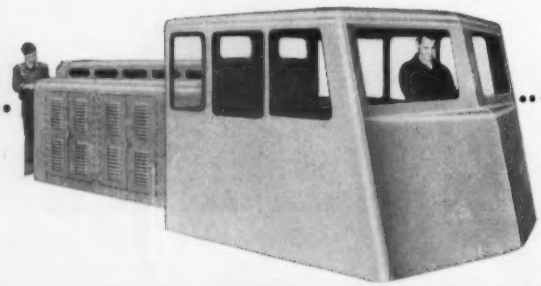


Circle 9630 inside back cover.

See fast growth in use of ductile iron pipe

Production of ductile iron pipe will triple this year and by 1961 it is estimated it will climb to 100,000 tons annually. Ductile iron combines the low cost, machinability and process advantage of cast iron with the strength and toughness of steel. Its use is rapidly expanding as an engineering material for water mains, in underground gas distribution systems, and for pipes aboard tankers and in chemical plants.

Two recent major installations in Chicago — one for gas distribution, the other for water — point up the trend in favor of ductile iron.

Following successful underground installations of ductile iron pipe on a pilot basis to test its resistance to ground settlement and traffic stresses, Peoples Gas Light and Coke Company of Chicago is now using many hundreds of thousands of feet of this pipe in sizes ranging from 6 to 30 inches throughout its gas distribution system.

Ductile iron is also making a name for itself as a strong dependable material for water mains at locations where excessive earth settlement is likely to occur. In the spring of last year the City of Chicago made its first major installation of ductile iron water pipe in connection with the construction of the largest sewer built in the city in half a century.

During the laying of the pipe a heavy rainfall caused one of the banks to collapse. Although 48 feet of the 8-inch ductile iron water main shifted more than four feet as a result, none of the ductile iron pipe broke.

It is the combination of corrosion resistance, strength and ductility that is also gaining wide acceptance for ductile iron pipe in marine service. The triple threat of sour crude oil, sea water ballast and salt spray creates a corrosion problem when steel pipe is used.

Cast iron, on the other hand, tends to crack under the severe shocks occasioned by rough seas. Ductile iron pipe, which will withstand the corrosion, and bend and give under high stresses, has been installed aboard some 60 tankers to date.

Another major application of ductile iron pipe is in the chemical industry where graphitic protection is needed against corrosion and where strength, toughness and ductility are required to withstand stresses, and high temperatures and pressures.

Corrosion and deposits in boilers discussed

Factors that influence deposition of solids and cause corrosion of metals in boilers and gas turbines are extensively discussed in a research report compiled by the Battelle Memorial Institute for the ASME Research Committee on Corrosion and Deposits from Combustion Gases.

Coverage includes the mineral constituents in coal and in heavy fuel oils, and their behavior during combustion; the SO_2 and the SO_3; the purely physical aspects of deposition, that is, the actions of particles in the gas stream that may bring them close enough to a surface to be captured; what is known about the origin and composition of deposits and what methods are used to minimize them; high temperature corrosion effects; corrosion of metals exposed to combustion gases below 400°F, and the removal of solids from combustion gases.

The review, "Corrosion and Deposits in Boilers and Gas Turbines" costs $6.00 ($4.80 to ASME members).

Industry spends more for R & D

Research and development budgets in close to 600 U.S. corporations are 12 percent higher this year than 1958's record outlay, according to a survey released recently by the American Management Association.

A total of 64 percent of the firms studied increased their budgets for the development of new products and processes, 8 percent were unchanged, and 28 percent reduced budgets.

Among the 23 industry groups studied, Electrical Machinery had a budget hike of 23.8 percent, Instruments 29.7 percent, Engines and Turbines 2.8 percent, and Fabricated Metal Products 5.7 percent.

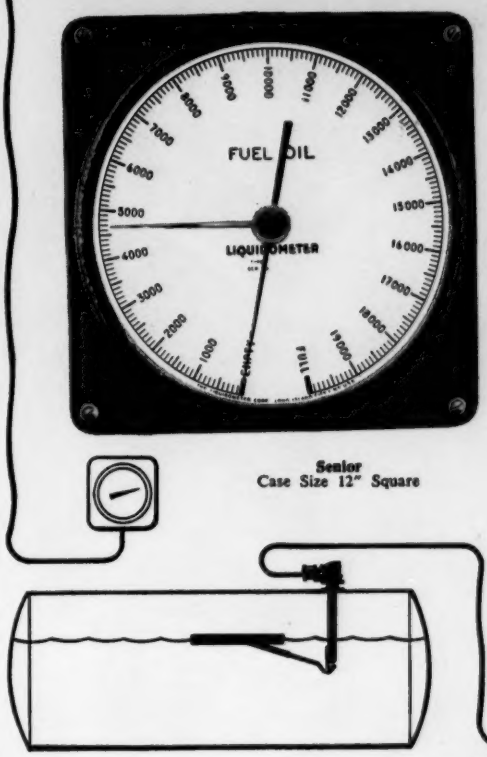
The AMA analysis has been developed to assist companies in formulating guide lines for the charting of their corporate growth programs. It provides some indication of the relative shift in emphasis that will be reflected ultimately in new product offerings in selected industrial groups.

Resistor alloy has low density

A low density resistor alloy possessing high electrical resistivity — 815 ohms/cmf at 20°C — and a low temperature coefficient of resistance which is inherently controlled within guaranteed limits of ± .00001 ohm/ohm/°C (± 10ppm) has been developed by Hoskins Mfg. Co., Detroit. Material is intended for use in the manufacture of precision wire wound resistors and potentiometers.

Designated "Alloy 815-R", the resistor material is basically a modified iron-chromium-aluminum composition containing small percentages of several other elements. These plus special melting and processing techniques combine to give it exceptionally uniform physical and electrical properties.

The material presently available is precision drawn to standard wire sizes ranging from 0.0031" (40 gauge) down to and including 0.0005" diameter — all of which are offered bare or insulated to meet a wide range of application requirements. Standard insulating coatings include oleo-resinous, polyester-base and polyurethane enamels in wash, single or heavy coated thickness.



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Liquidometers may be used on all grades of fuel oil from the lightest to #6 or Bunker C, Diesel Oil, Gasoline, Kerosene, Alcohol or practically any other liquid.

For residential tanks or small industrial plants several sizes of Levelometer gauges are available.

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Located anywhere in the boiler room, motor speed controllers for DeBothezat Induced Draft Bifurcator® Fans permit *complete draft flexibility.*

As draft requirements vary during starting and fluctuating loads, fan speed can be adjusted for optimum boiler performance.

DEPENDABLE . . . COMPACT Direct motor drive eliminates belts. Motor is completely isolated from fumes and heat. This results in such dependable performance, these DeBothezat units are widely used in unattended radio-TV relay towers and pipeline stations.

DeBothezat Induced Draft Bifurcators are available for high pressure boilers delivering up to 60,000 pounds of steam per hour and low pressure boilers delivering up to 190,000 EDR.

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Circle 9632 inside back cover.

Protective maintenance of motors, generators

Renewal Parts Section of NEMA has produced a 63-page booklet on "Protective Maintenance of Motors and Generators."

Intended primarily for maintenance men the booklet contains an appendix showing NEMA Standards for Classification of Coils, Insulating Materials, Replacement Commutators and Assembled Segments; Authorized Engineering Information on Armature Winding Supplies; Guides for Maintaining Continuous Operation of Motors and Generators, Preservation of Renewal Parts for Electrical Rotating Apparatus, and proposed Definitions of Renewal Parts.

The standards are to assist purchasers in obtaining the proper products to meet their particular requirements and to facilitate the work of those engaged in repair and maintenance operations.

Field tests of material in the booklet establish it as a ready reference for the handling of everyday maintenance problems common to electrical rotating machines. Of special interest to maintenance men are four "planned" forms in the back of the booklet — two for motor, generator and control maintenance records, and two for motor service records.

Individual copies may be obtained without charge from NEMA Headquarters, 155 East 44th Street, New York 17, N. Y. Quantity copies may be purchased from NEMA at bulk rates.

For local control of air pollution

Whether air pollution control (see page 16, August PLANT and POWER SERVICES ENGINEER) should rest with local, state or Federal authorities is still a matter for serious discussion and debate.

Speaking before the Air Pollution Control Association, Mr. Ernest Hart, President, Food Machinery Chemical

Corp., stated the position of the Manufacturing Chemists' Association.

Declared Mr. Hart: "The MCA holds that air pollution enforcement should be in the hands of, and be the responsibility of, local governments. We maintain that this has the same legal basis as local traffic control. We believe that such control can be and usually is adequate; that it can be more responsive to the needs of the particular locality; that it should *not* become an additional burden on taxpayers of other areas, and, finally, that it is far more economical than national or even state control.

"But we all recognize that there are still great unsolved problems, and some of them are growing. In this field of research, we think the Federal Government has not only a legitimate place, but also an obligation.

"However, we do not think that this research work can be done solely by the Government, and we feel that all phases of private enterprise must carry on their fair share of this research.

"The key to success in both research and all phases of control is cooperation. By this I mean close and continuing working together by all governmental agencies and by industry. Such cooperation already has achieved some outstanding results. Let us not hamper these research efforts and do unnecessary harm to our enterprise and our economy by premature and unthought-out governmental regulations."

Works 4 ways to keep costs low!

Micro-Lok...new Johns-Manville fiber glass pipe insulation saves hours on the job... saves fuel and power costs

No pipe insulation does more than Micro-Lok to save installation time and keep insulation costs low!

Micro-Lok opens easily, springs closed automatically because it has full-length "spring-hinge" action in each section. The hinge actually runs the full length of each section. This, plus its one-piece construction, saves on installation costs in many ways. It helps free workers' hands more quickly for sealing tabs and other operations, contributing to over-all efficiency.

Micro-Lok is the first pipe insulation made of fiber glass which was developed for easy cutting and fitting of the inside diameter around joints and fittings, pipe hangers and other irregularities.

Micro-Lok is available in standard wall thicknesses . . . especially ½" and ¾" . . . for all pipe and copper tubing sizes. The insulation is offered in a choice of factory-applied jackets including canvas, vapor-barrier and flame-resistant . . . to cover a wide range of operating conditions.

For further information on sizes, thicknesses and applications, contact your nearby Johns-Manville representative. Or write to Johns-Manville, Box 14, New York 16, N.Y. In Canada, Port Credit, Ont.

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How Micro-Lok speeds application—improves temperature control—saves fuel dollars

"Spring-Hinge" Action. Easy, full-length opening . . . automatic closing . . . and one-piece construction increase worker efficiency.

Light Weight. Weighs only a fraction as much as other materials . . . yet does a more effective insulating job.

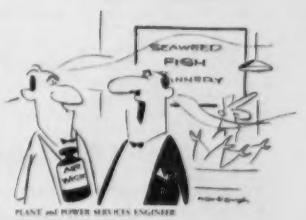
Resists Abuse. Resilient Micro-Lok won't break, crush or crumble during shipment or application. The material is pleasant to handle, too.

Snug Fit. Accurate molding of inside diameters and knitting of fibers at joints provide a tight seal.

Superior Thermal Performance. Its finer, longer fibers create countless heat-trapping air spaces . . . surpassing the efficiency of many commonly used materials and permitting more effective temperature control. For still greater efficiency—a unique manufacturing process gives Micro-Lok uniform insulating performance throughout the section. Temperature limit 350F . . . to sub-zero.

Moisture Resistant. Inorganic glass fibers are noncellular . . . do not absorb moisture . . . won't rot, shrink or swell. They're noncombustible, too.

Circle 9633 inside back cover.



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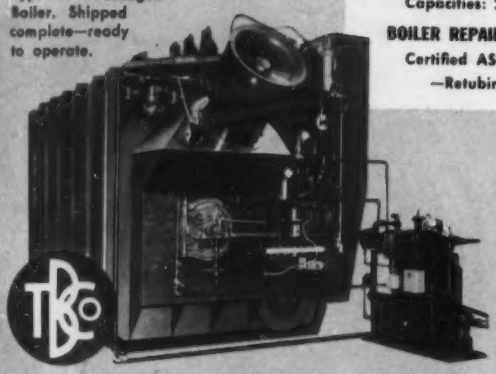

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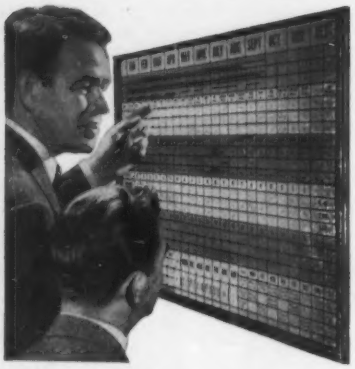

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Air pollution course to be given by NYU

The Institute of Industrial Medicine of the New York University-Bellevue Medical Center is offering a two-week course in air pollution. Given with the NYU College of Engineering, the intensive course is designed for engineers, physicians, industrial hygienists, and others concerned with the problem of community air pollution.

Topics covered will be of interest to those concerned with means for reducing industrial emissions, determination of the severity of pollution, associated health hazards, and government regulations.

Among topics to be covered are: applications of meteorology, sampling and analysis, internal combustion engines, power plants, and pollution control in specific industries.

Course is full time November 30 through December 11. Tuition is $100.

For applications and further information write the Office of Associate Dean, New York University Post-Graduate Medical School, 550 First Avenue, New York 16, New York.

1958 safety record —an improvement

Workers employed by member companies of the National Safety Council were hurt less often in 1958 than in 1957, but the injuries they suffered were slightly more severe, according to the Council's 1959 edition of "Accident Facts."

Of the 40 basic industry classifications, 28 had reduced injury frequency rates or no change, while 22 had lower injury severity rates.

The Communications industry again led the field with a low employee injury frequency rate of 0.97. Electrical equipment was second again with 1.76, while Aircraft manufacturing's 2.18 placed it third again. The electric utilities frequency rate was 6.39, unchanged from 1957.

Coated insulating materials

A completely redesigned line of coated insulating materials that includes bondable silicone rubber tapes has been announced by GE.

The bondable silicone rubber tapes are available in both supported and unsupported form, either of which can be hand- or machine-taped. Because of their unusual sealing properties after curing, GE engineers said, these tapes are ideal for use with electrical systems exposed to moisture, abrasives, and severe atmospheric contaminants. In many cases use of silicone rubber insulating tapes can eliminate expensive housings and protective enclosures.

For applications where high flexibility is required and physical strength requirements are less demanding unsupported silicone rubber tape is available.

Both tapes are designed for curing under heat and pressure without special treatment. Typical uses are in motor and generator coils and slot sections, high-temperature laminated cable, transformer layer insulation, turbine-generator bars, and aircraft wiring harnesses and cooling systems.

Atomic power as an energy resource

Professor Richard A. Tybout of Ohio State University has prepared a 94-page monograph containing the latest information on world energy resources and needs.

After reviewing the promises and limitations of atomic power on the basis of present and foreseeable technologies, Professor Tybout concludes that:

1. Atomic power offers a valuable long run supplement to the world's energy resources.

2. *Large scale replacement of conventional fuels by atomic power in the United States is a long way in the future,*

but when undertaken will require adjustment in social patterns, such as major reliance on electrified transportation and more concentrated living in urban centers.

3. Atomic power has very little to do with economic development of under-developed countries, but offers some promise as a supplemental energy source in such mature but high energy-cost regions as Western Europe and Japan.

4. Atomic power will cost more than conventional power in the United States for many years to come.

A final section of the monograph gives a thorough review of the various financial and other aids being made available to American industry for the development of commercial atomic power. Special attention is given to the problems created by the installation of high cost atomic power plants in today's electric utility systems.

In 18 tables, the author presents data which show comprehensively the stage of atomic energy development in relation to other fuel resources.

Copies of monograph No. 94 are available for $2.00 from the Bureau of Business Research, Ohio State University, Columbus, Ohio.

1000°F steam produced by reactor

Nuclear superheated steam of 1000°F has been generated by heat from the Sodium Reactor Experiment marking the highest steam temperature ever produced by heat from an atomic reactor.

The SRE, located in Santa Susana Mountains near Los Angeles, is an experimental nuclear power development project conducted by Atomics International for the AEC. The power reactor has been operating for two years and has provided heat for the production of 15,355,000 kilowatt-hours of electricity by the Southern California Edison Company's generating plant adjacent to the reactor.

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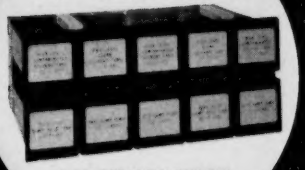

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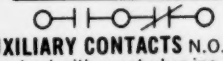

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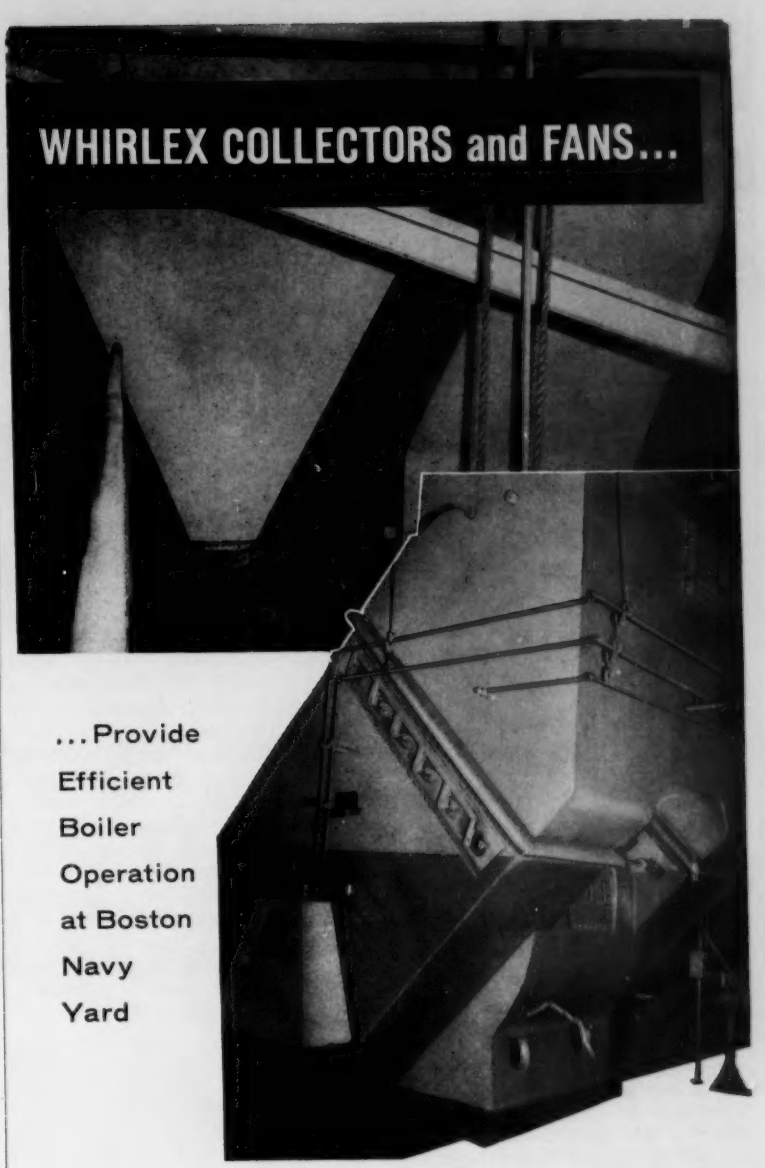

...Provide Efficient Boiler Operation at Boston Navy Yard

The WHIRLEX collector and fan shown here are part of an integral system installed at the Boston Navy Yard. The unit is designed to carry hot gases and is complete with a re-injection system. The Whirlex custom built fan is designed to absorb thermal expansion in any direction and features water cooled bearings and built-in inlet damper controls.

Complete information on this and other WHIRLEX installations is available to you at your request.

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Steps up performance in primary or standby installations

FASTER VOLTAGE RECOVERY—Rated voltage is restored within one second after load is applied or removed, compared to 5 seconds with rotating exciters.

LESS VOLTAGE FLUCTUATION—Voltage fluctuation with load changes is less than half that of standard-type generators.

GREATER RELIABILITY—Eliminates hundreds of electrical connections, the commutator and its brush rig.

FEWER ADJUSTMENTS—No extra sensitive adjustments necessary. Regulator has no delicate multiple contact points.

EASIER SERVICING—All exciter and regulator components are easily accessible. No dismantling necessary.

New Magneciter generators are now standard equipment on all Onan Electric Plants of 100, 125, 150, 175 and 200KW, as well as on many smaller sizes. A choice of Diesel or gasoline engine power is available on most Magneciter-equipped models. Complete specifications on any or all Onan units will be sent on request.

Onan ELECTRIC PLANTS

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Circle 9638 inside back cover.

ASSOCIATION NEWS

. . . reports of conventions, papers and people from associations of interest to plant and power services engineers

IES elects new head

Illuminating Engineering Society has recently elected Joe E. Browder, Atlanta utility executive, to head its organization.

Mr. Browder who is assistant to the vice president in charge of sales and sales manager for the Georgia Power Company is presently completing a two-year term as vice president of the society.

Other officers include: James R. Chambers, sales manager, Lighting Products Division, Appleton Electric Mfg. Co., vice president for a two-year term; and Charles W. McCormick, commercial sales manager, Connecticut Light and Power Co., is the new general secretary. G. Franklin Dean, supervising engineer of lighting service, Toronto Hydro-Electric System, Toronto, Ont., Canada, was re-elected treasurer.

New ASA booklet

A total of 425 American Standards, projects concerning national standardization activities in industry, science, and the arts are described in a 52-page booklet, "Current Projects of the American Standards Assoc."

In addition to listing the projects under ASA's 19 standards categories, the booklet describes the scope of each project, provides an index, and lists the sponsors. Where the project is handled by a sectional committee operating under ASA auspices, the officers of the committee are listed.

Cost of the book is 75c for members and $1.50 for nonmembers. It may be obtained by writing to ASA, Department PR, 70 East 45th St., New York 17, N.Y.

Air pollution analysis issued by ASTM

Continuous analysis and recordings of atmospheric pollutants is necessary for an adequate appraisal of the hazards of the pollutant and the effectiveness of any remedial measures undertaken.

In recent years, a large amount of effort and talent has been directed toward the development of instrumentation to analyze the atmosphere for many different compounds and classes of compounds. This is the subject of four papers in a symposium sponsored by the American Society for Testing Materials.

The cost of the book is $2.25 and is available from the ASTM Headquarters, 1916 Race St., Philadelphia 3, Pa.

Compendium covers laws for water pollution

State and Federal water pollution abatement laws of the U.S. have been compiled in a 53-chapter manual.

Designed primarily to be a handbook for reasonably easy reference, the handbook covers the laws of the fifty states, federal laws and those of the District of Columbia and Puerto Rico pertaining to water pollution.

One chapter is devoted to each state of jurisdiction. It describes the organization of the water pollution control commission or agency and gives its address; describes the commission's water pollution abatement policy, gives a resume of the law and briefly outlines the rules and regulations in force.

Copies of the Manual W-5 Compendium of Water Pollution Laws are available at $5.00 each from the Manufacturing Chemists' Association, Inc., 1825 Connecticut Ave., N.W., Washington 9, D.C.

Electromagnetic relay conference

Thirty-one papers covering the Seventh Annual Conference on Electromagnetic Relays held at Oklahoma State University, at Stillwater, Oklahoma have recently been published.

(Copies of the booklet may be obtained from the Advertising Department, Potter & Brumfield Division of American Machine & Foundry Company, Dept. P&PSE, Princeton, Ind.)
Circle 9639 inside back cover.

Real cool air boosts efficiency

Industry is finding that controlled temperature and humidity improve the functioning of both the mechanical machine and the human machine — the two major factors in efficient production, according to Rudy Berg, president of ARA.

During 1958, it was estimated over $550,730,000 was spent (installed cost) to equip large multi-room buildings, offices, apartments and commercial and industrial plants with central station air-conditioning systems, according to the Air-Conditioning and Refrigeration Institute.

Less than 10 percent of U.S. factories, plants and other industrial establishments now have air-conditioning, but, as management recognizes the economic benefits of air-conditioning through improved employee health and morale, lower rates of absenteeism, increased efficiency, and greater production, this market becomes increasingly important.

Many hitherto unknown industries are developing, to which controlled conditions of temperature and humidity are essential, and many others in which close tolerances are vital, are finding that air-conditioning materially reduced costs arising from rejection of parts which do not fit when final assemblies are produced.

Stop Oil

Electronic association changes name

The current growth pattern of the West's electronic industry is reflected in a recent change of name for the nation's second largest electronic trade association. Formerly the West Coast Electronic Manufacturers Association, the group is now known as the Western Electronic Manufacturers Association.

Companies headquartered in the West and East Coasts are now locating branch operations in the states of Arizona, Utah, Colorado, New Mexico and Texas — where practically no electronic industry existed five years ago, according to John A. Chartz, WEMA president.

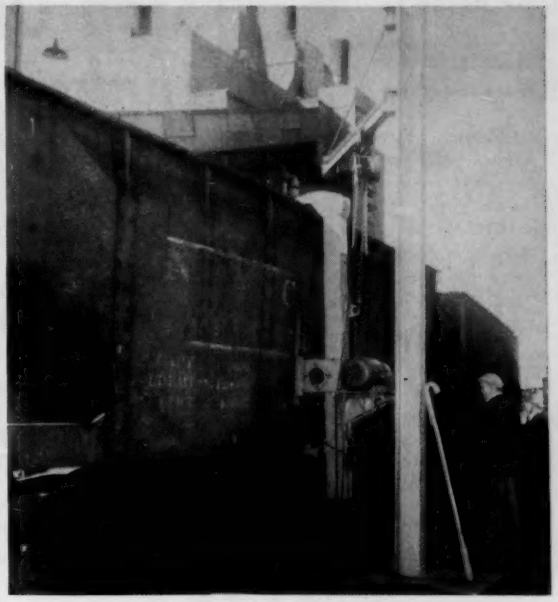
Climate, living and recreational facilities have attracted a high caliber of technical personnel to the West, and all other factors being equal, said Chartz, expanding electronic firms will first look to those areas where technical manpower and production capability is outstanding.

Develop manpower like products

"It is equally important for enlightened management to develop men as well as new products," according to L. A. Hatch, vice president of Minnesota Mining and Mfg. Co., speaking before the national meeting of the AICE.

The best answer seems to be to assign both experienced key men and selected, inexperienced men to work together. This choice permits management to multiply its effectiveness and to perpetuate business growth through the development of both new products and new and more competent manpower.

Three ways a company can solve the problem of survival and grow and expand to increase profits are: expansion of established products, development of related new products and development of unrelated new products.



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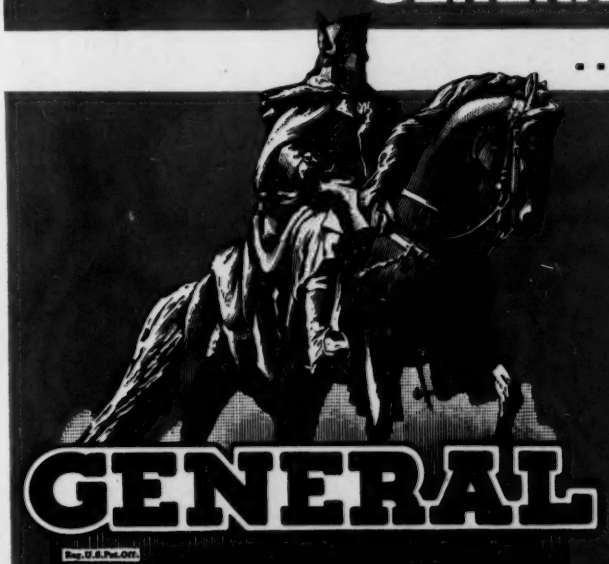

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Manufactured in special grades for pneumatic tools, NON-FLUID OIL provides trouble-free lubrication, while automatically protecting against rust and sticking. The "NR" Grades of NON-FLUID OIL absorb ever present moisture in compressed air into the lubricant, forming a stable emulsion. Thus, despite air moisture content, you are assured of perfect lubrication and complete protection against rusting, gumming or sticking. Tool speeds will be increased from 10% to 30%.

"NR" Grades use special low pour point base oils which permit FREE FROM FREEZING operation during coldest winter weather.

Leading manufacturers of air tools use NON-FLUID OIL for initial run-in after assembly and recommend its continued use. If you are not using NON-FLUID OIL for your pneumatic tool lubrication we suggest you give it a trial. SEND FOR FREE TESTING SAMPLE AND BULLETIN 550.

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Circle 9642 inside back cover.

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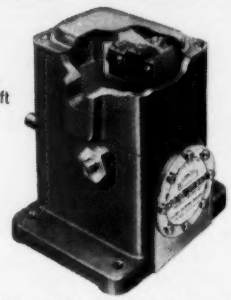

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PROTECTS conveyors • elevators • feeders • belt conveyors

OPERATING SPEEDS of 10 to 150 rpm make the **ROTO-GUARD** applicable to automatic protection of slow-moving machinery used in material handling and similar systems

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Write for Bulletin RG-16

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Circle 9695 inside back cover.

NOVEMBER, 1959
VOL. 1 NO. 7
Plant-Power Services Engineer

How to get uninterrupted steam at "interruptible" fuel rates

The Stuart Co. found that burner unit on steam boilers gave quick gas-to-oil changeover and enables them to take advantage of lower gas rate furnished on an "interruptible" or "surplus-demand" basis

KARL ROBE
West Coast Editor
with **A. R. TUTSCHULTE**
Manager, Manufacturing Div.
The Stuart Company

The Los Angeles area operates on a "surplus-demand" control for natural gas used by industry. On this basis, it is necessary to use some other fuel during peak periods when consumer demand is high. The rate for "interruptible" gas service is more than one-third cheaper than a "non-interruptible" contract.

Of course, to get "uninterruptible" steam, it is necessary to have facilities for using other fuel during the gas shut-off periods. In planning a new pharmaceutical-manufacturing building, The Stuart Company of Pasadena, Calif., wanted to have top capacity and rapid changeover from gas to oil for its boilers.

The gas supply can be interrupted on a "24-hour-or-less" notice. Although it has never happened, "less" could mean "10 minutes." Therefore, the changeover has to be just as rapid.

Stuart Company installed two 172-hp boilers incorporating gas-oil burners.

To convert from gas to oil, operator removes guard bar, swings oil burner into place, tightens one hand bolt and switches fuel valves. In returning to gas, process is reversed. No readjustment of air supply is necessary.

Rated capacity of gas burners can be developed with natural gas at two- to three-inches of gas pressure at the burner. Controls permit operation of unit at a wide range of gas pressures.

When on standby, fuel oil (No. 6 or lighter) is metered into a high-speed horizontal cup. Thin film of oil spins from this cup and enters the high-velocity primary and secondary air systems.

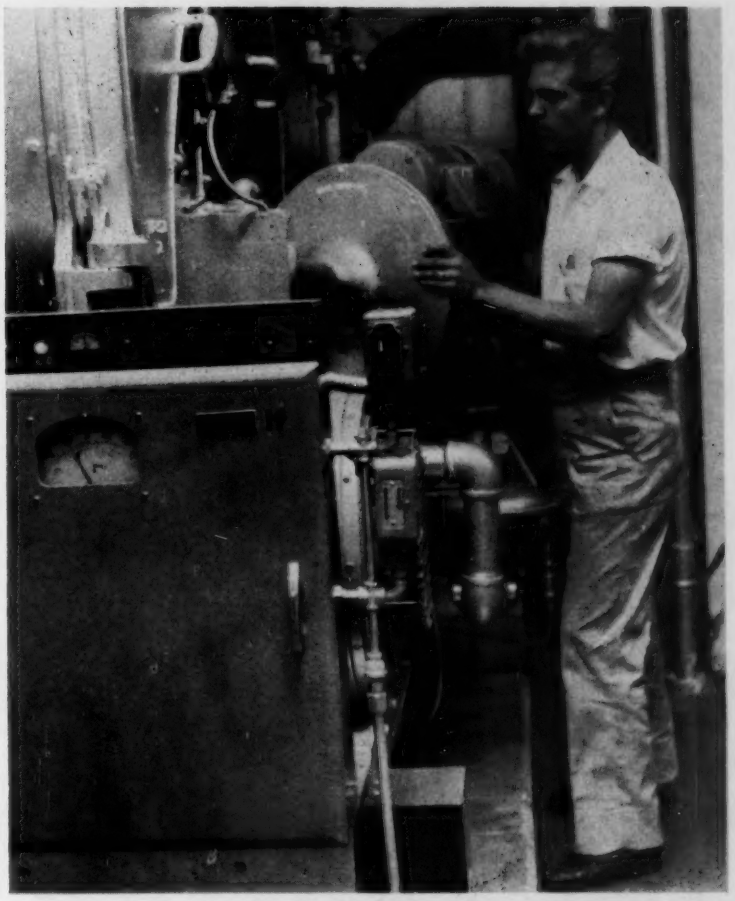
A 5000-gallon fuel oil storage tank is used for the standby system.

Air volume is precisely controlled under changing load conditions by means of linkage of atomizing and secondary air controls to oil-metering pump. Burner units incorporate forced-draft fans for operation without stack and combustion-control instrumentation.

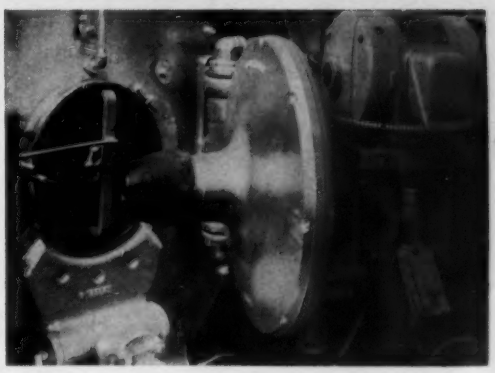
An important fact in connection with use of oil in the Los Angeles area — the oil burner must pass stringent smog inspection . . . and this one has!

(RCF gas-oil burner units are product of Iron Fireman Manufacturing Company, Dept. P&PSE, 3170 W. 106th St., Cleveland 11, Ohio.) Circle 9644 inside back cover.

(Boilers utilized are product of Kewanee Boiler Company, Dept. P&PSE, 101 Franklin St., Kewanee, Ill.) Circle 9645 inside back cover.



In switching from gas to oil, circular oil burner plate is swung into place for rapid changeover. Gas inlet is pipe directly under burner



Closeup of oil burner unit — thin film of oil spins from the horizontal cup and enters high-velocity primary and secondary air systems

Beats the heat on gas turbine

On the air-intake duct, sound-absorbing, vinyl-faced insulation was pressed onto welded studs at top and sides. Spring clips hold semi-rigid sheets in place

Mesh-faced blanket insulation was applied to top and sides of exhaust duct. Expansion joint is at center and stack is on the right

Mineral wool insulation does dual job of conserving heat and controlling vibration noise in both air-inlet and exhaust ducts of Venezuelan gas turbines

In the gas-turbine power plant recently constructed to serve a new crude oil shipping terminal built at the entrance to Lake Maracaibo in Venezuela by Compania Shell de Venezuela, one class of insulation is performing several important functions for the efficient operation of the plant.

These include the conservation of heat and control of vibration noise on air-inlet and exhaust ducts of industrial gas turbines and the prevention of condensation on the exterior surface of the inlet duct.

The power plant consists of two 5000-kw gas-turbine generators installed by Westinghouse Electric International Co. The turbines normally burn natural gas, but diesel oil may be used. A 750-kw gas-turbine generator of British manufacture has been installed for starting power.

Filtered air is supplied to each power turbine at a high velocity through 50 ft of 4-by-7-ft steel-plate duct, of which 40 ft is located indoors. This latter 40 ft of duct is insulated primarily to deaden the noise of air flowing in the duct.

Inlet duct insulation consists of 1½-inch thick sheets of semi-rigid spun mineral wool felt. Since the duct operates at a slight negative pressure producing a lower air temperature inside, some condensation was expected to form on the exterior surface. Therefore, a vinyl coating was applied to the insulation at the factory to act as a vapor barrier.

The duct was prepared for insulation by welding 3/16-inch diameter by 2-inch long wire studs to the top of the duct on 2-ft centers and to the sides on 18-inch centers.

After having been cut to size where necessary, the felts were impaled on the studs and secured by 1½-inch square speed clips. The sheets are sufficiently compressible to conform to mild surface irregularities without special preparation. All joints were sealed with pressure-sensitive vinyl tape.

The exhaust duct presented a more complex insulation problem due to the high temperature of the gas (750°F). The insulated portion of the exhaust system comprises 20 ft of almost 6-ft square horizontal duct and the lower 7 ft

and noise ducts

of a 45-ft tall stack.

Here, two types of mineral wool insulation were used to protect working-level areas from exhaust temperatures. Their application was designed to allow movement of duct sections at expansion joints as well as thermal expansion of the duct itself.

The exhaust duct was prepared for insulating by welding blind nuts on edge to both top and sides and on the bottom of the section outside of the building. Wire studs were welded on 12-inch centers to the bottom of the indoor section before erection.

Two loops of 14-gauge and one loop of 16-gauge galvanized wire were inserted in each nut.

The bottom of the exhaust ducts were insulated with three-inch spun mineral wool blanket, cut to fit around duct supports and impaled on the studs inside the building.

A one-inch galvanized wire mesh was stretched tight across the bottom of the blanket, and both blanket and mesh were fastened with four-inch square washers and speed clips.

Outside the building, the underside of the duct was insulated with three-inch spun-mineral-wool insulating block. The blocks were drilled to make ½-inch diameter holes to fit over the nuts. They were laced in place using the longer of the wires previously placed through the nuts, while the shorter wires were used to secure the wire mesh to the block surface.

The sides and top of the ducts, both inside and outside, were covered with multi-layer insulation to provide adequate thermal barrier while allowing for expansion.

First, one-inch thick blanket was set in place and held temporarily by fibrous adhesive. One set of tie wires was drawn through the blankets. Then, two layers of 1½-inch block drilled to receive the wire loops were placed over the blanket.

The flexible blankets were placed right over the duct stiffeners, and, then, six-inch wide blocks were laid over the blankets and secured by lacing tie wires across them diagonally. Wire mesh, secured with the second pair of tie wires completed the installation.

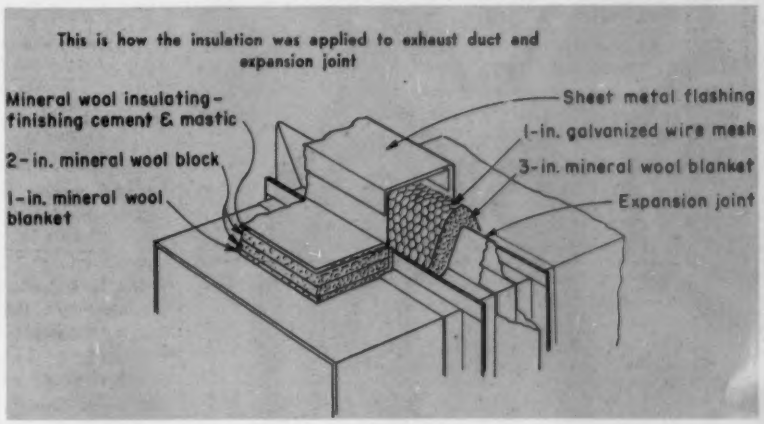
All holes and open joints were pointed with insulating-finishing cement.

On expansion joints, a three-inch thickness of blanket, covered by overlapping sheet metal flashing, provided an expandable thermal barrier.

Except for the expansion joints, the entire duct was surfaced with a ½-inch layer of white, mineral wool insulating-finishing cement. Outdoor areas were covered with a second layer of wire mesh, secured by the same wires as the first layer and finished with a waterproof mastic.

(Mineral wool insulation is a product of Baldwin-Ehret-Hill, Inc., Dept. P&PSE, 500 Breunig Ave., Trenton 2, N.J.) Circle 9646 inside back cover.

On the exhaust duct, laced block insulation was finished with insulating cement on indoor stretches of duct and with waterproof mastic outside of building


This is how the insulation was applied to exhaust duct and expansion joint
Mineral wool insulating-finishing cement & mastic
2-in. mineral wool block
1-in. mineral wool blanket
Sheet metal flashing
1-in. galvanized wire mesh
3-in. mineral wool blanket
Expansion joint

An education in fuel cost evaluation . . .

Here's a Lesson to be Learned from an Improper

Often, unrealistic considerations creep into the evaluation of fuels for a new steam plant. The University of Kentucky learned that you can't "compare apples with oranges" when selecting the right fuel for most economical operation

H. A. COUNTRYMAN
Editor

PROPER evaluation of fuel costs is difficult, if not impossible, when such cost studies are inaccurate, incomplete, or are drawn up to favor one fuel over another. A recent experience at the University of Kentucky is typical of that in many institutions and industrial plants where misconception has led to confusion in fuel selection.

When considering the design of a heating plant for their new $28 million medical center, the University authorities assumed that gas would be the proper fuel for such a plant. Their thinking was indicated to the consulting engineers in charge of the plant design who then proceeded with specification of a gas-fired plant, without any study or valid consideration being given to other fuels. While design was in progress, the Engineering Staff of the State Department of Finance heard of the arbitrary selection of gas and requested that the consultants prepare a study of the comparative costs of gas vs coal.

This study was based on the originally proposed plant of two 50,000-pound-per-hour boilers with 3500 tons of refrigerating capacity for air conditioning.

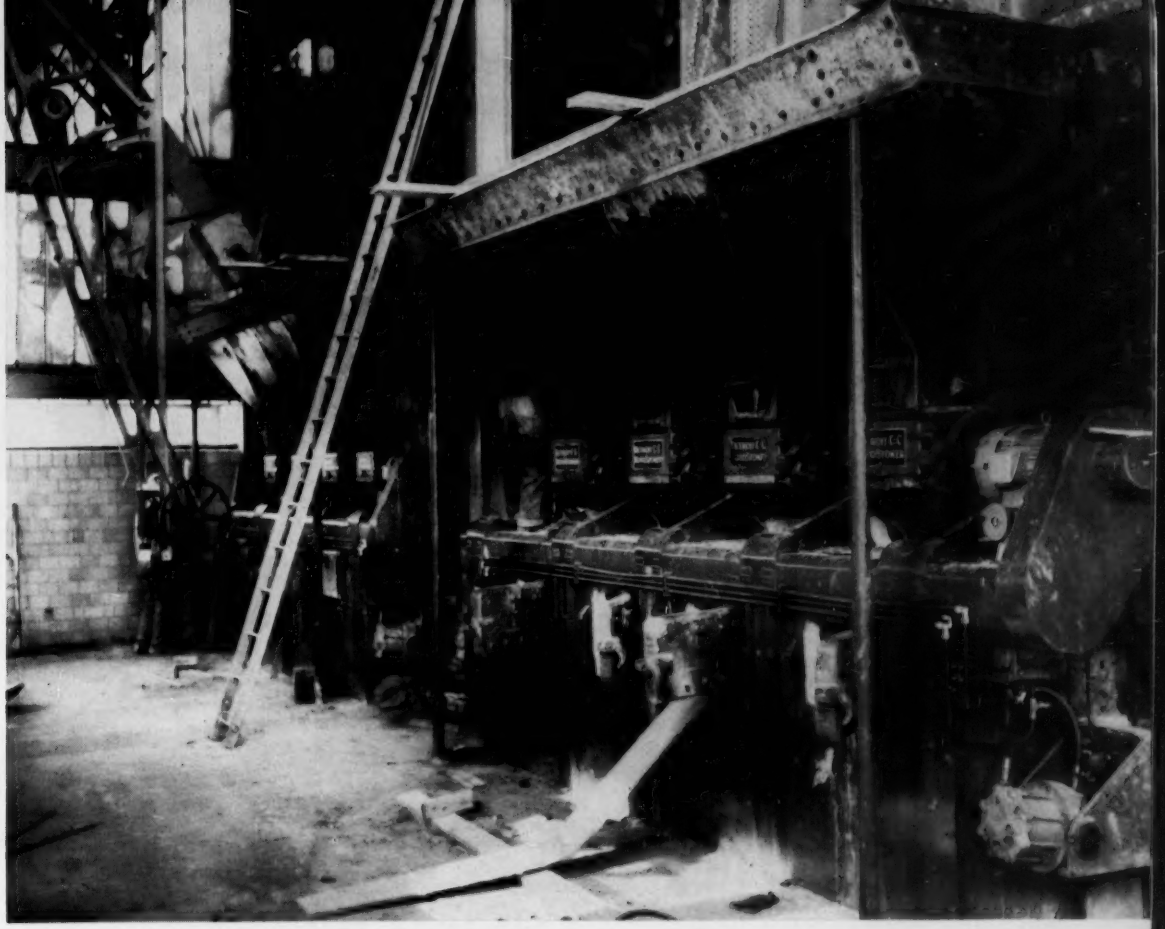
Table I shows the breakdown of the consulting engineer's fuel-cost comparison study. Gas cost factors were: summer gas 8 months at 40c/mcf plus step rate, winter gas 4 months at 45c/mcf, with a gas heat value of 1020 Btu/cu ft. Coal was figured at $8.60/ton, 13,000 Btu/lb as received, 5% ash, and $1.00/ton for ash removal. Electricity was figured at 1c per kw-hour. Gas required was based on 75 percent yearly efficiency and coal on 70 percent efficiency.

The estimated additional costs for the coal installation as compared to gas with

Table I — First Comparison Gas vs. Coal Operating Costs

Gas Fuel Cost		Coal Fuel Cost	
1. Summer Gas 75,000 mcf	$ 31,400	1. Heating and Process Steam $\frac{100{,}000{,}000 \times 1100 \text{ Btu/lb} \times \$8.60}{2000 \times 13{,}000 \times 70\%}$	$ 51,900
2. Winter Gas $\frac{48{,}000{,}000 \times 1100 \times \$0.45}{1020 \times 1000 \times 75\%}$	31,000	2. Refrigeration Steam $\frac{93{,}000{,}000 \times 1100 \times \$8.60}{2000 \times 13{,}000 \times 70\%}$	48,200
3. Electric Refrigeration Drive $\frac{3500 \times 1.1 \text{ bhp/ton} \times 2000\text{hr} \times .747 \times \$0.01}{88\%}$	65,300	3. Ash removal	580
		4. Electrical Auxiliaries Consumption $\frac{25 \text{ hp} \times 365 \text{ days} \times 24\text{hr} \times .747 \times \$0.01}{88\%}$	1,860
		5. Added electrical drive on cooling tower due to steam condensing load	830
		6. Added electricity for condenser water pumps	4,480
		7. Added labor compared to gas-oil plant 2 men/shift x 4 shifts x $3,500	28,000
		8. Added repair parts	5,000
		9. Interest on additional capital investment $370,000 x .04	14,800
Total Yearly Gas and Electric Cost	$127,700	Total Yearly Coal Operation	$155,650

Cost Study



Final power plant called for use of two B&W 60,000 lb/hr boilers with Detroit Stoker RotoStokers. Use of coal conveyor and silos eliminated need for outdoor coal storage area

oil standby are in Table II.

From this study it would appear that the coal installation would require an additional capital expenditure of $370,000 and that the coal operating costs would exceed gas by $27,950 annually.

In their summary to this report, the consulting engineers stated: "From the economic standpoint, we cannot find any justification for the use of coal for this facility. Both the yearly operating costs and the initial investment are substantially greater than for gas-oil and electric."

As a check on this report, the state engineering department consulted recognized experts in the fields of fuel economy, plant layout, refrigeration, etc.

An analysis of the consulting engineer's report soon revealed that operating cost comparisons had been made for two quite dissimilar refrigeration plants. Electric-refrigeration drive had been assumed for the gas-fired plant and steam-refrigeration drive for the coal-fired plant. Coal had been charged with an additional cost of $70,000.

Coal had also been charged with an unrealistically low efficiency, with too low heat content, and with $28,000 in unnecessary annual labor costs. When these adjustments in annual operating costs were made, the savings with coal, using steam refrigeration, were found to be $18,640 per year.

Estimation of installation costs were also found to contain a number of charges against coal that were unjustifiable. An open coal yard at $15,000 and a bulldozer at $12,000 (items 1 and 2 in Table II) would not be needed since coal would be delivered by truck from a local retailer or directly from nearby mines.

Overhead coal bunker system of coal handling (items 3 through 7) was excessive in cost ($54,000) in comparison to more economical 200-ton silo system at $37,000. A dust collector with hoppers, insulation and platform costing $20,000 (item 9) was charged against coal, when actually such equipment is not required with traveling grate stokers.

Although individual stub stacks could have been used for either coal- or gas-fired boilers, the final decision was for a single, high-stack. It was felt that the stub stacks might have allowed fumes to be drawn into the air-conditioning system in the hospital and other buildings and thus create a problem. So the cost of a large stack and breeching (items 13 and 14) could not be charged against coal alone.

In a modern coal-fired plant with silo, no basement and no overhead bunkers are required, so the $50,000 charge for extra building cubage (item 15) was eliminated.

With the deletion of costs for a large stack and breeching, plus costs for a different refrigeration system, **the new**

Table II — Estimated Additional Costs for Coal Installation

1. Open coal yard, including moving of substation, etc	$ 15,000
2. Bulldozer	12,000
3. Coal pit and grating	3,000
4. Conveyors from pit to bunker	20,000
5. Bunker, dusttight	25,000
6. Coal scales	4,000
7. Transfer chutes and gates	2,000
8. Ash pits	4,000
9. Dust collectors, hoppers, etc.	20,000
10. Dustless ash silo	20,000
11. Ash ejector system	10,000
12. Stokers, gates and boiler design, excess over gas-oil equipment	60,000
13. Stack	20,000
14. Breeching and insulation	8,000
15. Extra building cubage for conveyors, bunkers, etc.	50,000
16. Architects' and engineers' fees	20,000
17. Miscellaneous	11,000
18. Extraction steam turbines, condensers, piping, air ejectors, etc., as compared to motors, etc. for electric drive machines.	60,000
19. High pressure auxiliaries and boiler trim compared to 175 psig	4,000
Total Additional Cost of Coal Installation	$370,000

Another Smokestack

Rising some 120 feet above the landscape at the University's new A. B. Chandler Medical Center will be a majestic smokestack, carrying off the waste products of what has been estimated at a minimum of 40 tons of coal per day.

While there is disagreement as to precisely how much smoke this plant will generate, or how detrimental it will be to surrounding areas, there are other points to be considered. The planned installation is being made against the recommendation of a firm of engineers with some 44 years experience in building medical structures—including the Mayo Clinic in Rochester, Minn.

We do not have the technical knowledge to debate the relative merits of different fuels for this plant, nor do we intend to convey an approval of one fuel over another. Considered on their own merits, either natural gas, electricity or coal could be proved—with proper juggling of figures and relative advantages—to be the superior fuel.

It does seem, however, that the recommendation of a competent engineering firm would be enough assurance that one type of fuel is more suitable than another. Conversely, it is difficult to understand how state authorities can justify the choice of coal as a fuel, especially when a analysis showed it to be neither as economical nor as efficient as other fuels.

No reasons for coal being chosen have been given, but several possibilities are evident. It would, some might say, aid the state's economy. But the consumption of the medical school plant, estimated at about 11 500 tons annually, would hardly the coal industry enough to ju spending $870,000 merely for equipment.

Other problems also are First, there is no railroad plant site; unless one is b will have to be brough Additionally, ashes w hauled away from th truck. Too, there coal reserve wh stored somewhe strikes or shipr while some problem, w similar ir roundinr theirs smok

Use Of Coal At Med Center Is Defended

Study Showed It Would Cost Less, State Official Says

A charge that the use of coal to heat and cool UK's new A. B. Chandler Medical Center will cost $27,950 more a year than the use of natural gas and electricity was denied last night by a state official.

G. F. Beckler, chief of the engineering staff of the Department of Finance, said that coal heating and cooling will cost less in the long run.

A story in yesterday's University of Kentucky student newspaper, Kentucky Kernel said that the decision to use coal was made June, 1957 "in the face of [redacted] recommendations by [redacted] consultants" on the project. [redacted] was retained by [redacted] project—[redacted] decision cost [redacted] gas

Traylor Attacks In U.K. Fuel Fuss

Says Firm Used Incomplete Data In Urging Gas for Medical Center

The Courier-Journal Frankfort Bureau

By KYLE VANCE

Frankfort, Ky., Oct. 10.—Finance Commissioner Orba F. Traylor charged Friday that "incomplete information" was used to support recommendations that gas should be used to heat the University of Kentucky Medical Center.

He said an exhaustive study by the State led to a decision to reject the recommendations and all the trimmings," he said. of a professional consulting firm and use coal instead.

The report of [redacted] gas-powered equipment could be installed at a saving of $370,000 over coal-burning equipment and that the use of gas would be $27,950 a year cheaper.

Says Figures Misleading

Traylor charged that [redacted] designed a gas power plant because top university administrators wanted it and then tried to defend the design with misleading cost figures.

[redacted] said the coal-fired plant would cost $130,000 more but that an annual saving of $42,000 a year gained from using the fuel would retire the added capital investment in just over three years.

Traylor said [redacted] took into account [redacted]

Turned Over to D-

Chandler's file Traylor said [redacted] apparently acts" when recommenda- from every- declared. ering staff of the of Finance had not complete [redacted] design request from the Na- coal Institute asking for estigation as to why gas being used when they could e coal was more economi- Beckler said.

Gov. Chandler then requested James W. Martin, then commissioner of finance, to have his engineering staff make a complete study, Beckler continued.

The chief engineer said his department called in engineers and

"There will be no more smoke from coal, if the plant is properly handled, than from gas. The university now and it has exclusively proper uses coal ex- and smoke problem."

The coal-vs.-gas controversy erupted in March, 1957, when B. F. Reed of Drift, president of the Kentucky Coal Association, urged Governor Chandler to consider coal as the "far more economical" fuel. Reed said he had been advised that serious consideration was being given to gas.

SATURDAY, OCTOBER 11, 1958 3

Figures On U.K. Heating Plant Disputed

Frankfort, Ky., Oct. 11 (AP)—Misleading figures were used to support a proposal for gas heating of the new University of Kentucky Medical Center, State Finance Commissioner Orba F. Traylor charged yesterday.

The State decided to use coal, he said.

The recommendation was made by the professional consulting firm of [redacted]

Traylor said the firm designed a gas-fired power plant because university officials wanted it, then tried to defend the design with incomplete information.

The finance commissioner said the university advocates of gas heating were Dr. Frank Willard, dean of the Medical School, and Frank D. Peterson, university controller. Neither was available for comment.

Traylor said the [redacted] report said gas equipment could be installed at a saving of $370,000 over the cost of coal-burning equipment, and that the use of gas would be $27,950 a year cheaper than coal.

The State refigured the costs more realistically, Traylor said, and found that although the coal plant would cost initially $130,000 more than a gas plant, an annual saving of $42,000 from the use of coal would retire the additional capital investment in just over three years.

Traylor said the [redacted] report took into account the most expensive coal-burning equipment and the cheapest gas plant. The fuel costs were figured at retail prices on coal and at the lowest conceivable price on gas, he added.

Traylor said another objection to the [redacted] report is that it made no provision for the use of coal as a stand-by fuel in case of a national emergency or a shortage of gas.

He said there would be no smoke problem from the use of coal, because the most elaborate coal-handling and firing equipment would be used.

Fuel Battle in Headlines —

Some idea of the attention given to the fuel study for University of Kentucky Medical School's power plant is clearly shown in these clippings from local newspapers

From preceding page

actual installation costs for coal and for gas/oil were only approximately $130,000 more for coal, which amount could be amortized in about 6½ years with the savings in coal operating costs.

Stability of Fuel Costs

Another factor not considered in the consultants' report was the stability of fuel costs over the operating life of the hospital boiler plant.

Within 150 miles of the hospital in Lexington are some of the best and most ample coal reserves in the country. Extensive mechanization and preparation facilities promise low-cost coal of high quality for years to come.

In contrast, the contract offered by the local gas company was to extend only over a one-year period, with annual renegotiation and price agreement.

Gas offered was on an interruptible basis contract, with the gas company insisting on installation of a stand-by fuel because of the likelihood of interruptions during the winter months. In January of this year, after the hospital decision had been made for coal, several large plants in the Lexington area were forced to close down to conserve gas fuel for home heating. This verified the belief that conversion to oil would have been frequent and costly.

To provide double insurance for the supply of coal from nearby mines, an arrangement was made with a local yard for permanent storage of a two weeks supply of fuel for the plant based on anticipated quantities.

A final decision was made to increase the size of the two boilers to 60,000 pounds per hour each with a peak of 70,000 pounds per hour each. The refrigeration system was also changed to turbine-driven centrifugal machines with two 1000-ton machines and one 1500-ton machine. The increase in size of these units did not change the comparative fuel-cost estimate except to increase the advantage for coal in this plant. ■

Water treatment unit at Biron has been protected from corrosion by cathodic protection since 1956. Inset shows leads (top) and anode supports.

Cathodic protection using impressed current system . . .

Protects water treatment equipment against corrosion

AT one time, coatings were used to control corrosion on equipment used for treating raw river water at three different plants of Consolidated Water Power & Paper Co. of Wisconsin. However, these coatings lasted only about two years.

The comparatively short life of coatings and long drying time for their reapplication required extensive scheduled downtime in the filter plant. In spite of these measures, some of the steel on the equipment was still found to be pitting.

The units for treating water are being used at all three divisions of the company — Biron, Wisconsin Rapids, and Appleton. Since the Biron installation is representative, its story will tell how the corrosion problem was licked.

At Biron, a 70′ by 70′ unit is used for processing the raw river water at the rate of 8 million gallons per day. Water-treating unit has outer walls of concrete, but inner mechanism and structures are made of mild steel.

Raw water is clarified by an alum-silica flocculation in which the pH varies from 5.2 to 6.0. Raw water is introduced into agitated center section of unit and mixed with chemicals and previously flocculated impurities.

Clear water then separates from mixture in outer area and is decanted while floc returns to center section. Excess floc is concentrated and withdrawn. Purified water is filtered and stored.

Under these circumstances it was decided that cathodic protection could be used to control corrosion of the steel parts. A system consisting of two electrical circuits was installed. Each circuit has a rectifier converting 110v AC to DC.

Each circuit uses a distribution lead system to high-silicon-cast iron anodes which are suspended at varying heights below the surface. Inner mechanism and structures are coated with a red-lead paint.

The Wisconsin Rapids unit uses the same type of anodes as Biron, but the Appleton unit uses silicon iron anodes under the hood, with aluminum anodes in draft tube and outside the hood.

Since the installation of the cathodic protection systems, no repair work or painting has been required on any of the three water-treating plants. No pitting or corrosion has occurred.

Installation at Biron was made in 1956 — the one at Wiconsin Rapids in 1957 — and the one at Appleton in 1952.

(Cathodic protection systems were designed and installed by Electro Rust-Proofing Corp., Dept. P&PSE, 30 Main Street, Belleville 9, New Jersey.)

Circle 9647 inside back cover.

Put Coal Dust in the Boiler—

A recent switch to heat-dried coal for a higher heat value and improved production made the dust control problem even more critical for American Maize Products Co., Roby, Ind. The coal is used both for the generation of process steam and electricity.

Before the switch, American Maize had been feeding air-washed coal directly from railroad cars through a pulverizer into the boilers. Up to 12% moisture in the coal caused it to hang up at various points in the system (the piping leading to the bunker, coal spout and the rotary feeders). Whenever this happened, steam pressure dropped and production efficiency suffered.

Heat-dried coal has less tendency to hang up than air-washed coal. Its heat value is higher due to the much lower moisture content.

In addition, the smaller particle size requires less pulverizing. However, in handling, it creates a larger dust problem.

This dust problem was acute at each transfer point between the hopper car and the boilers. To eliminate the problem, a spray-type dust control system was installed at these points.

A series of chemical sprays were installed over the hopper cars at shakeout, at the opening of the track hopper, and at transfer points of the feeder conveyor belts.

Now, this may sound like it is defeating the original purpose of buying heat-dried coal, but it isn't. As little as one-half of one percent of moisture applied in the proper manner is sufficient to keep all the fine coal particles from rising into the atmosphere.

The nature of the sprayed liquid makes it possible to allay dust with this small amount of moisture. The liquid is a chemical combination of an activating agent, called

A push on the button starts spraying water-chemical mixture that controls coal dust at various transfer points with minimum amount of moisture being added to coal

Not in the Air

Spray-type dust control system keeps coal dust in the pile and out of the air. This system more than pays for itself by reducing housekeeping, permitting the use of better quality fuel and reducing fuel handling problems — all at less than one cent a ton

Compound MR, and water. The chemical reduces the surface tension of the water so that complete wetting of all particles is obtained with much less moisture than is necessary with untreated water.

Cost of the chemical is approximately one cent a ton. This represents almost the entire operating expenditure. There is practically no maintenance, only a periodic cleaning of the spray heads. Electricity used is too small to be considered. Initial expenditure was $9800 including labor and material.

First application of the spray is atop the hopper car. Spray jets mounted on the overhead car shaker prewet the top surface of the coal to prevent any dust from rising.

A single-track entry into the unloading area limits unloading from one car at a time. Although top hourly capacity is 100 tons, moving cars in and out hold unloading to 450 tons daily.

The spray is next applied at diagonal corners of the hopper receiving coal from the cars. These sprays keep the dust so well controlled that they can be seen during the entire unloading operation even though they are actually about six inches below ground level.

Two other treatments — at the discharge of the track hopper and at the end of the inclined conveyor belt — complete the dust control system.

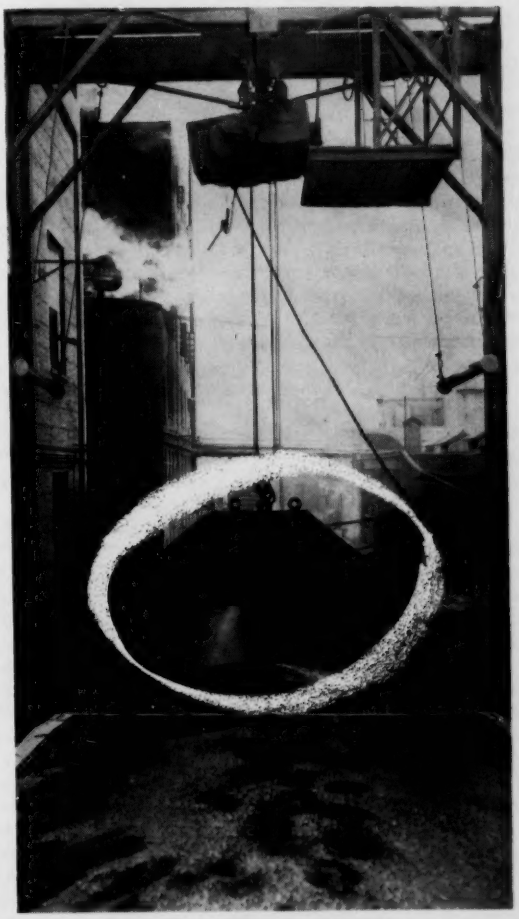
Heart of the entire system is proportioning of the chemical and water and distributing the solution throughout the piping system. Mixing of the compound and water is accomplished by a bellows-type pump accurately proportioning one part of chemical to 750 parts of water in a mixing tank.

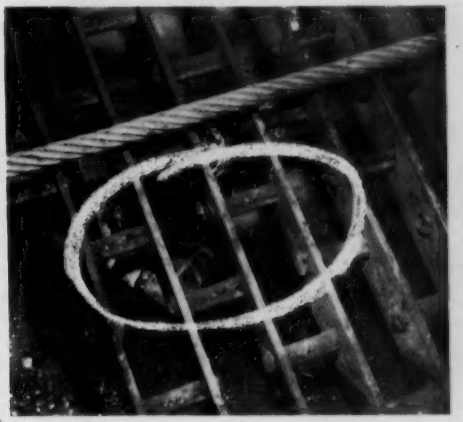
A turbine pump, rated at 17 gpm and 87 psi, distributes the solution to the spray headers. Each of the spray headers is controlled by either pushbuttons or automatic paddle arms that actuate the headers whenever coal is being moved by the conveyors.

It's hard to put a dollars and cents figure on housekeeping, but American Maize feels that the system is paying for itself in increased production, and better personnel and community relations.

(Chem-Jet dust control system was designed by The Johnson-March Corporation, Dept. P&PSE, 1726 Chestnut Street, Philadelphia, Pennsylvania.)

Circle 9648 inside back cover.

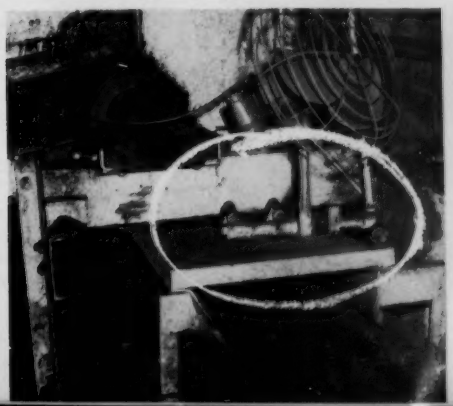




First application of spray is made atop hopper car. Spray jets are mounted on overhead car shaker and wet top surface of coal to prevent dust from rising

The spray is applied again at diagonal corners of the hopper receiving coal from the cars

An additional application is made at conveyor transfer points between hopper and pulverizer



Why WELDED Feedwater

When asked this question, Chad O'Connor told our editors about the outages caused in his plant by conventional heaters — and about his trouble-free experience with a seal-welded design operating under very wide load swings

CHADWELL O'CONNOR
Superintendent of Production
Light and Power Department, City of Pasadena, Calif.

The City of Pasadena has been designing, building and operating its own steam power generating stations for over 52 years. Since we design and operate our own plants we are closer to many of the operating and maintenance problems that can be taken care of in the initial plant design. Before designing a new unit we look back over the records of outages, both planned and forced, as well as routine and unusual maintenance costs.

A good example of how our experience has affected design is in the case of feedwater heaters. Our records show that on a unit only six years old the high-pressure feedwater heaters have caused two shutdowns and several planned outages.

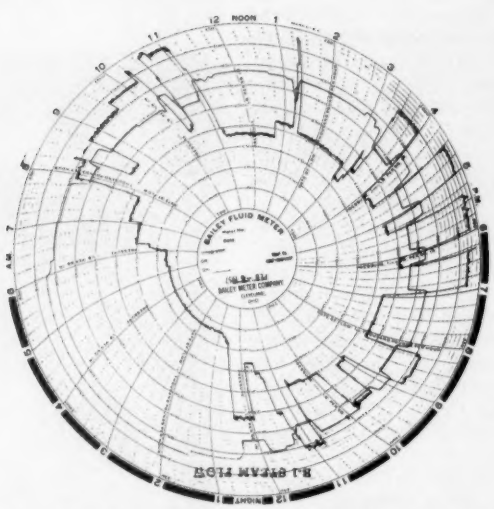
When we started the design of the first unit of the Broadway steam plant, we decided to reduce this problem by lowering the pressure on the high-pressure heaters. This was done by using the booster pump system. These pumps take suction from the deaerator and discharge water at approximately 400 psi to the first and second stage heaters.

The water from the heaters then goes to the main feed pump and then to the boilers. To make sure that the main feed pump always had water, the booster pumps were run by the same motor. With this system we were able to use 450 psi heaters instead of 1800 psi heaters.

This system has operated satisfactorily for over six years, carrying a very severe swinging load with far less maintenance than our previous high-pressure heaters. We did, however, experience some difficulty with leaking bonnets on the heater isolating valves.

We again checked our records and found that many of the previous heater outages were caused by the isolating or bypass valves. In fact, half of all heater outages on all units were caused by valves used in connection with these heaters. The valves would not hold tight enough to permit work on the heaters when underway.

We found that, from a purely statistical standpoint, we would have had fewer outages if we had had no valves on any of the heaters. But there was a big mental hazard in eliminating heater bypass and isolating valves.

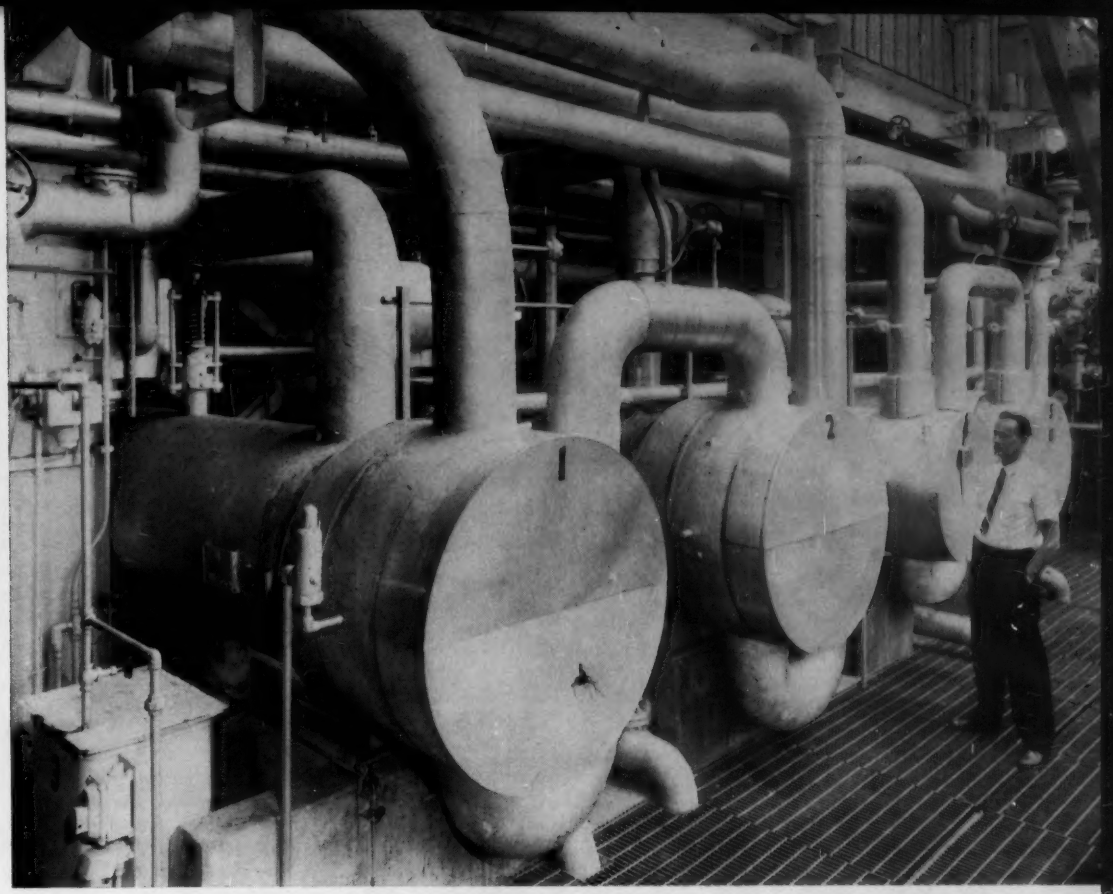


Steam flow chart for typical day when wind tunnel demands cause wide load swings. Pressure load relationship is designed on a sliding scale basis so that pressure is low at high loads and high at low loads, thus reducing overfiring requirements

When we started the design of the second unit at the Broadway plant, we came to the conclusion that if we could prevent tube leakage and channel cover leakage, we would install the heaters without valves. By so doing we would completely eliminate heaters and their associated valving as a source of frequent trouble and maintenance.

We had heard that some of the nuclear power plants were using welded heat exchangers so we contacted several heater manufacturers who had had experience along this line. One of these manufacturers spent a great deal of time

Heaters?

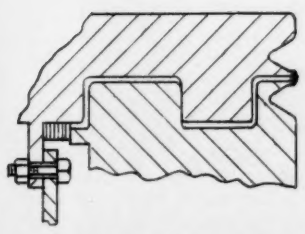


Two welded high-pressure (foreground) and two low-pressure feedwater heaters are installed without troublesome isolating and bypass valves

with us, working out the problems in connection with a completely welded heater with no roll tubes and with no gaskets or other pressure joints on the channel.

The manufacturer had had some experience with welded heaters at relatively constant temperatures and pressures. However, in our case the temperatures and pressures change considerably and repeatedly. In fact, we have one of the most consistently varying loads in the country for a central station.

These load swings are caused by the cooperative wind tunnel operated by the California Institute of Technology. This installation uses up to 30,000 kw. By contract this load can be picked up from zero to 30,000 kw in not less than three minutes. Durations of the runs are from 1 minute to 20 minutes. As a general rule we carry this swinging load on two 40,000-kw steam turbine units which were specifically designed by our engineering group to pick up and drop off 50 per cent of capacity on an average of 10 times per day. Our normal city load runs between 60,000 and 80,000 kw and peaks at about 120,000 kw. The accompanying load chart gives some idea of the wind tunnel load swings.



Section through feedwater heater channel shows breech lock design head, with pre-stressed welded lip for sealing

With this severe repetitive load swing condition the heater manufacturer, as well as ourselves, felt that we should test a heater before placing an order for all four heaters for the new unit. The manufacturer constructed a test heater which we installed in the first unit at Broadway with special valves so that the pressures and temperatures could be cycled rapidly.

We cooled the heater with condensate and heated it with feedwater at 400°F. At the same time the test heater was subjected to pressure changes from 100 psi to 1800 psi. The heater was cut into service and cycled continuously as fast as it could absorb the temperature changes. With this arrangement we were able to subject it to more than 10 years of our type of operation in approximately one week's time. No defects occurred. The results of these tests gave us sufficient confidence to proceed with the design and fabrication of the final welded feedwater heaters.

The tubes in these heaters are 70-30 copper nickel, welded to the tube sheets. The tube sheets are steel with furnace cladding of copper nickel ¼" thick. Thus the tubes and the tube sheet present the same non-corrosive metal surfaces to the water. As shown in the section drawing, the channel cover is of a breech lock design with a welded lip which is used for sealing. The breech lock holds the stress due to the pressure and the welded lip acts to seal the joint but carries no load.

As shown on the accompanying photograph, the low pressure, as well as the high pressure heaters, were installed without isolating and bypass valves.

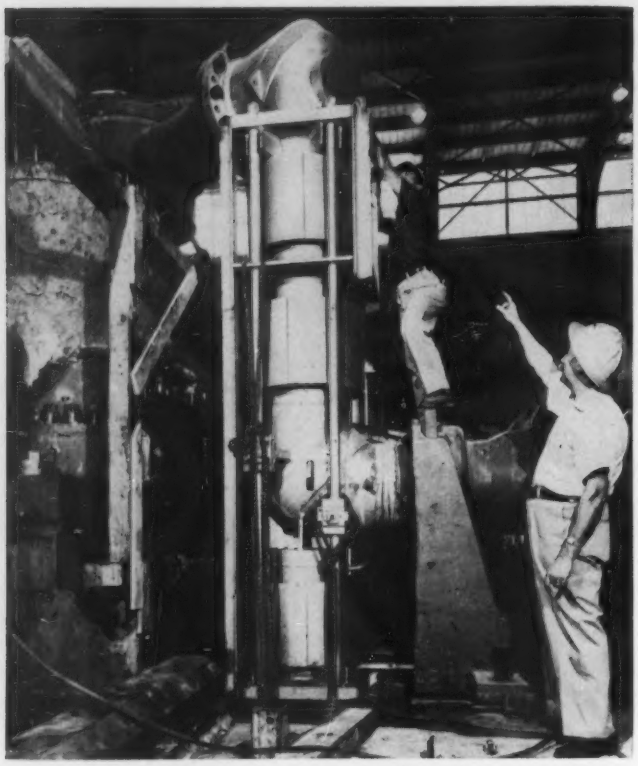
These welded heaters have been in continuous service for over two years in our second unit with no outages or maintenance of any kind. In fact, since going into commercial operation this unit as a whole has had only two outages, both of which were planned — the first one being for our routine turbine inspection after a year's operation. The second outage was for a matter of hours while brushes were changed.

(Welded feedwater heaters are manufactured by Southwestern Engineering Company, Dept. P&PSE, 4800 Santa Fe, Los Angeles 58, Calif.)

Circle 9649 inside back cover.

NEW SOLUTIONS

for your plant and power services problems



Expansion joints absorb movement in axial and lateral directions at flow-end bellows on 325,000 kw turbine-generator

Expansion joints fully protect large turbine

When Philadelphia Electric Company's Eddystone Generating Station goes into operation this fall, four unusual expansion joints will safeguard the intermediate pressure element of the super-pressure turbine-generator unit from the effects of thermal expansion created by cyclic operation to 1050°F at 251 psia.

The expansion joints are the universal toroidal pressure-balanced type and measure 20 inches inside diameter. They absorb thermal expansion, both axial and lateral, to provide minimum stresses in the turbine casing.

Toroidal corrugations were hydraulically formed in each bellows. Each joint has a set of three bellows, two at the flow-end and the other at the balancing end.

Although they will be operating at 251 psia, they have been hydrostatically tested at 472 psig.

(Expansion joints are manufactured by Zallea Brothers, Dept. P&PSE, Wilmington, Delaware.)
Circle 9650 inside back cover.

Gets complete automatic compressor operation around the clock

Precision compressor station control without attendant supervision provides continuous, economical central air service at Ford Motor Company's assembly plant at Lorain, Ohio. Employing four 400-hp air compressors, this installation is reported to be the largest central air compression system for this type of industrial air service.

By means of an automatic control system, demands for air are anticipated through capacity control of four motor-driven compressor units. The capacity control of the station is accomplished by five-step unloading on each of the four individual units.

The unloading function is initiated by a sensing system on the controls which actuates pneumatic valve lifters. The result is a simple control system instantly responsive to changing load demands.

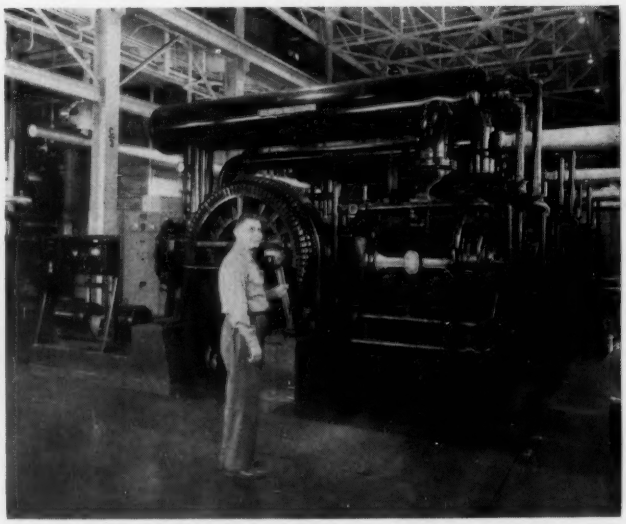
Watched over by a central control unit, the compressors are equipped to start on no load. They are manually started, then automatically controlled after proper running speed is attained. They are then regulated to run at capacity requirements from full load to no load without attendance.

The compressors used on this installation have a heavy-duty piston and cylinder design and are engineered for continuous service instead of intermittent service.

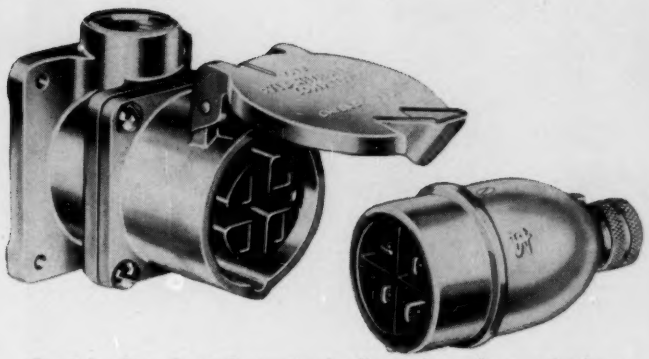
Driven at a relatively low speed of 400 rpm by synchronous motors, they operate at an unusually low noise level.

In constant operation after 10 months of service, the central air compressor station at Ford delivers industrial air into 8″ mains at 104 psi. The air is used to operate pneumatic tools, paint-spraying operations, and air-operated devices for the fabrication and assembly of automotive components.

(En-Tronic control system is development of Electronic and Controls Division of The Cooper-Bessemer Corporation, Dept. P&PSE, Mt. Vernon, Ohio.)
Circle 9651 inside back cover.



Manually started, the compressors are automatically controlled after proper running speed is attained



Circuit-breaking electrical connector handles outdoor safety switch jobs at Caterpillar Tractor Co.

Circuit-breaking connectors rack up 35% saving in safety switch job

Through the substitution of a circuit-breaking electrical connector for standard safety switches in two different applications at the Caterpillar Tractor Co. plant in Aurora, Ill., greater flexibility and cost savings have been achieved.

The company's engineers report that both ease of maintenance and a 35 percent cost saving were gained by the substitution of 315 weatherproof connectors for outdoor safety switches on the plant's roof ventilation fans.

The circuit-breaking connector was chosen because it would provide weather-resistance with less weight when compared to standard units.

The connector has long insulating paths which resist moisture and current-carrying dust. Partitions between the male contacts increase the length of insulating surfaces to prevent arcing from pole to pole and from poles to ground.

The compound circuit-breaking arc chambers ensure complete snuffing and cooling while the plug is still engaged in the receptacle housing. The plug can be inserted and withdrawn under full load condition at rated current up to 600v AC.

An additional problem of providing a disconnect for 200 portable electric job cranes was solved by the device. Requiring less installation space, the connector was mounted on the crane itself, lending more flexibility to the mobile unit.

("QuelArc" connectors are products of The Pyle-National Company, Dept. P&PSE, 1334 N. Kostner Ave., Chicago 51, Illinois.)

Circle 9652 inside back cover.

For more information on items reported in the New Solutions section circle corresponding numbers on reader service card inside back cover.

Boiler Tube Service

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Circle 9653 inside back cover.

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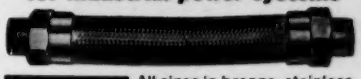

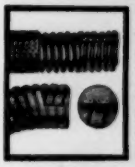

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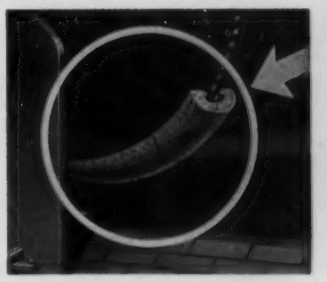
Circle 9654 inside back cover.

YOUR LUCK MAY RUN OUT

If the girth seam of your riveted HRT boiler has never buckled and leaked, you are fortunate. From the very nature of the case, your luck is likely to run out.

No one can predict when the seam will open up unless it is insulated with a National Seam Protector. *The way to prevent is to protect.*



We'll be glad to give you complete information by mail. No salesman will call.

National Boiler Protector Co.
938 Reibold Bldg., Dayton 2, Ohio
Since 1916

Circle 9655 inside back cover.

Heat pumps save 37% on initial costs, take up less space too

The use of packaged heat pumps has accounted for a 37 percent saving in installation costs for a heating and cooling system at the Congregational Christian Church of Fairfax County, Va. In addition, the units save space which would have been taken up by steam boilers and water chilling machines.

The 10 five-ton heat pumps were installed for $28,600. Architect's estimates for conventional heating and air conditioning were $45,000.

The space saving was accomplished by using the two-piece units with the compressors located outdoors. This amounted to 415 sq ft and meant that $5600 worth of building space could be used for classrooms.

The packaged air conditioning units give good zone control, thus permitting economical heating or cooling of meeting rooms, kitchen or pastoral offices individually at times when the entire building is not in use.

In operation, the heat pump costs are estimated at $1383 per heating season (at an average 2.3 cents per kw-hr, including demand charges). This is about $200 more than the estimate cost of heating with other fuels, but it is felt that this is more than paid for through the elimination of manhours needed to watch other types of equipment. The completely automatic heat pumps require operator who needs only to know how to set the thermostats.

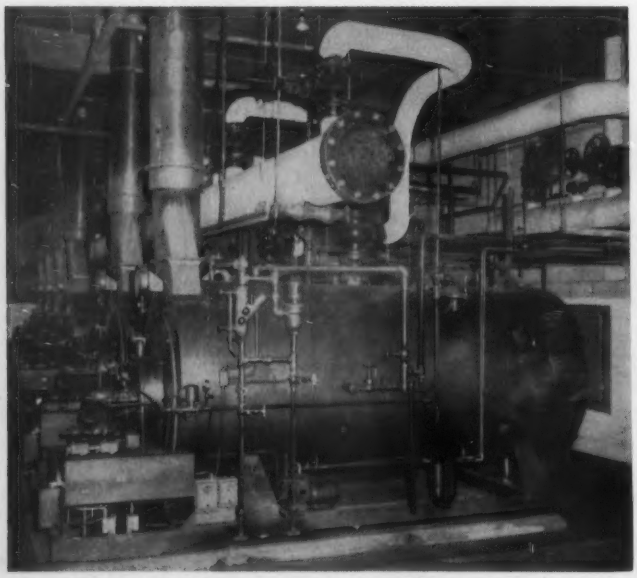
Ten packaged heat pumps have compressor units located in protected courtyard, unseen from the street

The equipment is ranged along the wall of an interior court of the church building. Nine of the ten indoor sections are stacked compactly in a central equipment room occupying 285 sq ft of floor space and 24 ft of exterior wall.

Manhours for installing the entire system totaled 1370.

(Packaged heat pump is product of Carrier Corporation, Dept. P&PSE, Syracuse 1, New York.)
Circle 9656 inside back cover.

Fits "more modern" boilers into existing steam system with minor changes



Six 125-hp combination gas-light oil packaged boilers replaced low-pressure unit to cut costs and labor

The Galion Iron Works & Manufacturing Company, Galion, Ohio, had been going along with an old stoker-fired low-pressure heating system for years. Efficiencies were extremely poor, especially during the spring and fall heating seasons. Labor costs were high because State laws required that a lincensed operator be in continual attendance.

After checking with other users in the area, the decision was made to install modern packaged boiler equipment. A study was made of requirements, the entire boiler room redesigned, boiler feed and return equipment selected and piping fabricated.

Six 125-hp combination gas-light oil packaged boilers replaced the old unit. All high-pressure steam to heat existing buildings was put through a reducing valve station and reduced to 12 psi so that the existing system need not be altered. All new equipment and new buildings were supplied with steam at 100 psi. Heat diffusers along with air make-up units were furnished for the foundry facilities.

Savings with the more efficient, automatically fired boilers have been so satisfactory that the plant now contemplates purchase of its seventh and eighth units to be installed next to the battery of six packaged boilers.

(Cyclotherm steam generators are manufactured by Cyclotherm Div., National U.S. Radiator Corp., Dept. P&PSE, 440 E. First St., Oswego, New York.)
Circle 9657 inside back cover.

Monitors silica in make-up water automatically and continuously

Silica concentration in demineralized make-up water is being analyzed automatically at The Detroit Edison Company by an instrument that measures concentration of trace materials down to parts per billion.

The analyzer continuously samples the make-up water, detects tiny traces of silica, and indicates the silica concentration. It, therefore, provides timely information in regards to the exact condition of the resin in the demineralizer anion exchangers and informs the operator when it needs regeneration.

The device now handles detailed colorimetric analyses that used to require eight separate steps with the manual "test tube" method.

Basically, the instrument's pump unit handles and measures the samples and reagents in a continuously flowing stream. The characteristic blue color indicating silica concentration is developed in the stream.

Color intensity is measured in a flow-type colorimeter, and its value is plotted continuously on the strip chart of a recorder.

In this case, the pump feeds the water sample and hydrochloric acid into a horizontal glass mixing coil simultaneously. Air is also admitted into the coil to facilitate mixing.

Next, the ammonium molybdate reagent is pumped into the flow. The stream then passes through a second horizontal mixing coil and into a long vertical coil to provide time for reaction. As the stream leaves the reaction coil, an amino acid reducing solution is pumped into it. It then enters another mixing coil and a second vertical coil.

Color is developed in the last vertical coil, and the stream finally flows through the photoelectric colorimeter and then to waste.

Color intensity is recorded on chart as percent light transmitted, which is easily converted to parts per billion of silica.

(AutoAnalyzer is product of Technicon Controls, Inc., Dept. P&PSE, Chauncey, New York.)

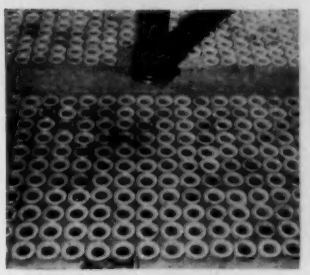
Circle 9658 inside back cover.

Automatic unit reads silica concentration in parts per billion

Stops inlet erosion on steam condensers

A 400,000 kw generating station in the Midwest suffered erosion on its five steam condensers. Considerable damage to the inlet ends of the condenser tubes was caused by suspended sand in the cooling water.

With over 44,000 ⅞" OD by 18 BWG tubes involved in the five 52,500 sq ft single-pass condensers, tube replacement and downtime resulted in heavy expenditure in both time and money.



Plastic inserts show no sign of wear after two years

In January and February, 1957, plastic inserts were installed in two of the condensers — a total of 17,800 tubes. These were inspected regularly, and no sign of wear existed at the inlet end. In January, 1958, they were installed in remaining units.

The inserts are designed in length to cover the critical area exposed to inlet erosion and are streamlined to eliminate restriction to water flow.

The inserts designed to be installed at existing installations have been made in graduated sizes to match the wear pattern found in normal installations.

They are adaptable to ferrule-type and flush-type tubes, including ferrule, flush-welded, rolled and trepanned tube sheet constructions. In welded sheets, the inserts provide additional protection to the weld with its dissimilar metal hazard.

("Alkaserts" plastic inserts are manufactured by Tennant Development Corporation, Dept. P&PSE, 100 Park Ave., New York 17, N.Y.)

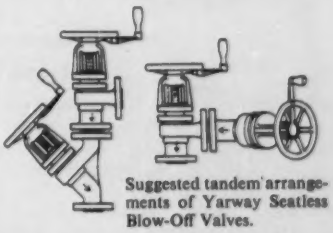
Circle 9659 inside back cover.

SIGN OF A GOOD PACKAGE BOILER

There are many good makes of package boilers—and practically all have this in common:

YARWAY BLOW-OFF VALVES

Names like Keeler, Combustion Engineering, Erie City, Cleaver-Brooks, Preferred Utilities, Titusville, Kewanee-Springfield and many others offer the known dependability of Yarway Seatless Blow-Off Valves. Many of them use Yarway as their standard.



Suggested tandem arrangements of Yarway Seatless Blow-Off Valves.

Look for Yarway Blow-Off Valves on *your* next package boilers. If they're not included, specify them to the manufacturer. For all the reasons, write for Bulletin B-427.

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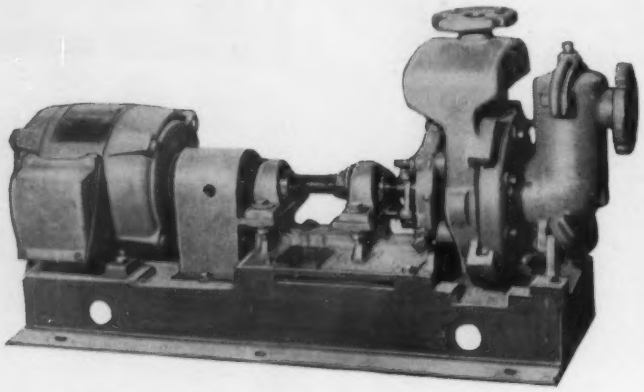
YARWAY
A MARK OF QUALITY IN STEAM ENGINEERING

Circle 9660 inside back cover.

NEW DEVELOPMENTS

for

effective plant and power services operation



Pumps have capacities to 1000 gpm with heads to 125 ft of water

Centrifugal pumps are self-priming

Trap holds the prime; suction is at top

Line of self-priming centrifugal pumps features a trap with a readily accessible and removable strainer. It is the trap that holds the prime. Suction entrance is at top of trap.

The separator below the discharge opening is an integral part of the casing and is designed so that the overall height of the pump is kept to a minimum.

Three types of bearing stands are available — one is designed for medium service or average conditions. Another is a complete unit (stand and water-end). The third is a heavy-duty unit in which much of the shaft is enclosed within the bearing stand.

All have capacities up to 1000 gpm with heads to 125 ft in sizes from 1″ to 5″.

Because of the self-priming feature, the pumps can be stationed above the liquid level. Water-end parts are made of a variety of corrosion-resistant metals to handle corrosive services.

("AW" Series centrifugal pumps are manufactured by Nagle Pumps, Inc., Dept. P&PSE, 1228 Center Ave., Chicago Heights, Ill.)
Circle 9661 inside back cover.

Makes floors non-skip; is corrosion-resistant

A non-skip, corrosion-resistant resurfacing compound is designed for "hazardous" areas covered with corrosive grease, oil, or liquids.

The material is chemically inert and trowels to a tough surface. It contains a sharp aggregate that penetrates oil films and makes a firm, non-skip contact with workers' shoes.

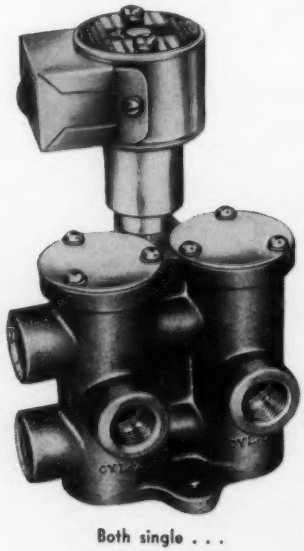
The material is reported not to soften, peel off, or dust under heavy floor traffic.

It is especially useful for stopping slipping accidents on ramps, dockboards, stair treads, and cat-walks.

(Chemi-Top Safety Floor is product of The Garland Company, Dept. P&PSE, Cleveland 5, Ohio.)
Circle 9662 inside back cover.

Valve opens, closes with one shot of current

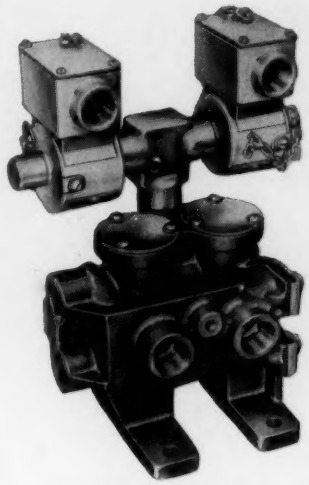
With momentary contact air valves, current is applied only for the instant it takes the valve to change position. It remains in that position with the power off.



Both single . . .

Single and dual solenoid units are available. Unit pictured in top photograph is a single-solenoid, two-position, four-way valve. The pressure port is open to Cylinder 2 port, and Cylinder 1 port is open to exhaust in normal position.

When solenoid is actuated by electric impulse, the solenoid plunger moves down actuating the pilot valve which in turn operates the main valve.



. . . and dual solenoid units are available

The momentary contact device then latches the pilot valve in this position, even after power is cut off. When an electric impulse once more energizes the solenoid, the solenoid plunger unlatches the contact device and allows the pilot valve and main valve members to revert to the original normal position.

The solenoid is de-energized and the valve remains in this position until the next actuation.

The dual units, for use in automated systems, prevent the valve from getting out of phase. In this unit, Solenoid 1 is actuated, and the pilot valve is latched.

An additional electric impulse to Solenoid 1 will not unlatch the pilot valve. Only by actuating Solenoid 2 will the valve revert to its normal position.

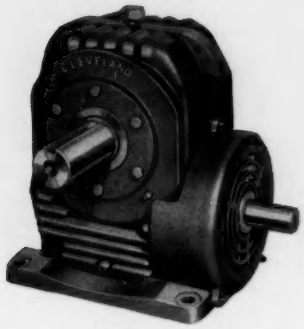
(Momentary contact air valves are product of Barksdale Valves, Dept. P&PSE, 5125 Alcoa Ave., Los Angeles 58, Calif.)
Circle 9663 inside back cover.

Higher horsepower with smaller speed reducers

Use of fan cooling, centrifugally cast bronze gears and special heat-treating techniques on alloy-steel worms permit higher input horsepower and output torque ratings with smaller speed reducer units.

Units already in production range from 1 to 40 hp. Larger sizes are in various engineering stages.

Housing of these units is rugged one-piece design of cast iron, ribbed for maximum strength and heat dissipation.



High-horsepower, fan-cooled speed reducer

Cooling fan is mounted on input end of worm shaft and is equally efficient in either direction of rotation.

For rigidity, only one gear shaft bearing plant is large enough to permit assembly of gear. On the other side of the housing, the gear shaft extension side, the gear shaft bearing is mounted in the housing bore and backed up by a clamping plate.

Housings are designed for mounting in one position only.

Worms are cut integral with shaft and accurately ground to a high surface finish on both thread flanks. Shaft extension diameter is large to permit increased overhung load capacity.

The gears have centrifugally cast bronze rims with a high tin-nickel content, made integral with a cast iron center. This construction results in a greater density and a higher hardness, giving increased resistance to wear and fatigue pitting.

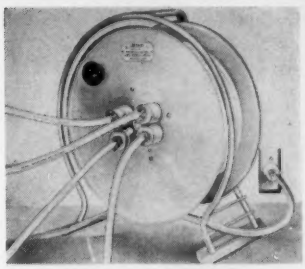
Both gears and worms are tested against "masters" for tolerances. Therefore, it is not necessary to replace worms and gears in sets. A new gear will operate perfectly with an old worm or vice versa.

(Speed reducers are manufactured by The Cleveland Worm & Gear Company, Dept. P&PSE, 3300 East 80th St., Cleveland 4, Ohio.)
Circle 9664 inside back cover.

Provides power outlets in portable power applications

Featuring four multiple-service, U-blade type receptacles, portable cord reel provides power outlets for a number of varied applications at one time — from one power source.

It is suited for construction, industrial, municipal, and public utility locations, wherever portable power is needed.



Cord reel has four multiple-service receptacles

The reel eliminates cord damage, preventing it from twisting, tangling or breaking. It has cord capacity of up to 375 ft, depending on cord size used.

It has a heavy steel-rod frame, a balanced-load carrying handle, large re-wind knob, and no collector rings, brushes or slip-rings to wear out.

(Model No. 910 Portable Cord Reel is product of Daniel Woodhead Company, Dept. P&PSE, 15 North Jefferson St., Chicago 6, Ill.)
Circle 9665 inside back cover.

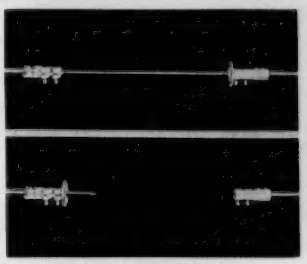
Manual bus disconnect is simpler to use and install

Permitting the substation to operate while equipment is being repaired or maintained, patented manual bus disconnect provides an economical, maintenance-free switch to sectionalize and isolate tubular bus.

The design permits its use in confined spaces with a saving in structural steel and foundation costs.

It does not require special mountings.

The bus disconnect switch utilizes two double-ended socket clamps coupled to the ends of the tubular bus. A sliding copper rod joins the socket members.



At top, bus disconnect is shown closed with sliding rod bolted to sockets on tubular buses. At bottom, the disconnect is in open position

In order to open the disconnect and sectionalize the bus, the bolts of the socket members are loosened, and the sliding rod retracted through one socket into the hollow tubular bus a predetermined distance governed by the stop plate attached to the rod.

To close the switch, the tubular rod is extended and bolted to the other socket member.

The bolts are designed with shoulders that expand the connector and prevent binding.

The disconnect may be operated by using standard hot line equipment.

(Manual bus disconnect is manufactured by Burndy Corporation, Dept. P&PSE, Norwalk, Conn.)
Circle 9666 inside back cover.

VISIBLE PROOF

of constant temperature control

with POWERS No. 11 *self-operating temperature regulator*

This big four-inch dial gives a quick, visual means of checking controlled temperatures . . . an accurate guide for regulator adjustment.

Designed for precise temperature control, the Powers No. 11 Regulator is self-powered . . . simple, compact and dependable. Full throttling action is gained without the aid of *any* external power source. Special valve stem lubricator eliminates binding. Big double ply metal bellows provide extra valve power — longer life. Union body assures easy installation.

For specifications, valve sizes, types and temperature ranges, call your Powers branch office—engineering services in 66 cities. Write for Bulletins Nos. 329 and 330.
The Powers Regulator Co., Dept. 1159, Skokie 50, Ill.

POWERS
TEMPERATURE CONTROL

Circle 9667 inside back cover.

V-type, two-cycle engine featuring turbocharging comes in three sizes — 10, 12 and 16 cylinders

Giving more horsepower in less space, gas engine has many design features

Combining low fuel consumption with simplicity and low maintenance, a V-type, turbocharged, two-cycle gas engine is designed as a compact, high-horsepower driver for centrifugal compressors, for power generation and for pump drive. Featuring 17″ by 19″ bore and stroke, the engine comes in three sizes — 10, 12 and 16 cylinders — rated at 4000, 4800 and 6400 bhp respectively. Compared to engines having the same number of cylinders, it produces up to 77 percent more horsepower per square foot of floor space.

BMEP rating is 110 psi, assuring low stress, long component life, high reliability and ample reserve capacity to handle temporary overloads.

The two-cycle design incorporates fewer parts and requires less maintenance.

The engine is equipped with a jet-air-started turbocharger. At normal operating conditions, it is completely self-sustaining and imposes no parasitic load on the engine. Throughout entire operating range, turbocharger speed is automatically matched to the engine and requires no attention from the operator.

The cylinder block is a heavily ribbed, one-piece casting of semi-steel. Power pistons are the two-piece, oil-cooled type.

Water-cooled, power cylinder liners in the block carry no tension loading of the cylinder heads, hence are free to expand as the engine comes up to operating temperature.

A three-piece, articulated connecting-rod assembly permits use of a heavy pin, cuts down rotating weight, provides balanced load distribution and achieves maximum crankpin bearing area without incurring the bearing length necessary for individual rod construction.

The crankshaft is a heavy, one-piece steel forging, precision machined. Shaft diameter is 15½ inches.

Other features include aluminum main and connecting rod bearings, full pressure lubrication, fully insulated exhaust manifolds, fin and tube scavenging air intercooler (air temperature is cooled at a 20°F approach to ambient), enclosed and lubricated fuel injection valve gear, and two centrifugal water pumps to handle jacket water and scavenging air cooling.

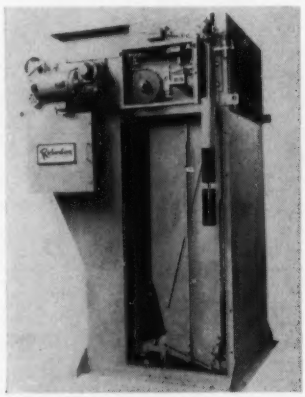
(Model TPV gas engine is manufactured by Clark Bros. Co., Dept. P&PSE, Olean, New York.)
Circle 9668 inside back cover.

1000-lb coal scale is automatic

Having an hourly capacity of 60 tons, 1000-lb automatic coal scale features greater accessibility to all critical parts. Eight doors permit quick removal of the weigh hopper and easy access to any part of the scale for inspection or adjustment.

The units have special linings and mountings to prevent coal dust from falling to the floor when the door is opened.

This is how the scale works: Coal enters from the bunker through an inlet opening with an inside measurement of 24 by 24 inches. It then passes onto a wide rubber belt feeder and is conveyed to a counter-balanced weigh hopper suspended from the weigh beam. This weigh beam contains hardened steel knife edges bearing in V-notched, self-aligning hardened steelings, thus reducing friction to a minimum.



Scale delivers pre-set amount of coal up to 60 tons per hour

When the weigh hopper is loaded almost to a pre-set weight, it comes toward balance. Switches, contactors and a solenoid are actuated by the loaded weigh hopper. They stop the belt feeder at balance, and the hopper is discharged.

A mechanical counter, directly linked to the operating levers, registers the number of discharges made by the scale. All main operating levers, linkages and electrical connections are outside the dust-tight scale housing and protected by covers.

(1000-lb coal scale is manufactured by Richardson Scale Company, Dept. P&PSE, Clifton, New Jersey.)
Circle 9669 inside back cover.

For more information on items reported in the New Developments section circle corresponding numbers on reader service card inside back cover.

Protects workers from radiant heat

To combat the discomfort of radiant heat and improve worker efficiency and protection in plants using high temperatures, an aluminized asbestos cloth has been developed.

This material is produced by adding aluminum foil, 0.0004 inches thick and laminated with a heat-resistant adhesive, to asbestos cloth. This combination makes a sturdy, flexible shield that is more than 90 percent effective in reflecting radiant heat.

It retains a great degree of strength at radiant temperatures up to 1400°F over long periods of time.

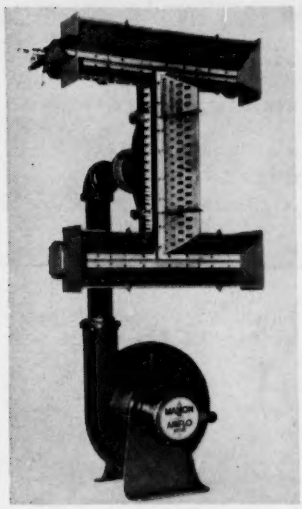
In tape form, it is adaptable as an outer-wrap for pipe lines.

(Aluminized asbestos is product of Johns-Manville, Dept. P&PSE, 22 East 40th St., New York 16, N.Y.)
Circle 9670 inside back cover.

Gas burner handles air heating jobs

May be used on single-flow, re-circulation

Flexibility of temperatures and loads is provided by gas burner system for producing hot air to be used in industrial ovens, kilns and dryers. The burner has a 25-to-1 throttling range.



Burner uses oxygen from air being heated

Based upon the principle of utilizing some oxygen from the stream of air being heated, the system may be used on either re-circulating or single-flow systems.

It may also be used for heating the make-up air introduced into industrial plants to replace that exhausted from spray booths, hoods, etc., through fans and stacks.

The burner with its stainless steel mixing plates mounts directly in the duct carrying the stream of air to be heated, and the mixer unit delivering carefully proportioned air-gas mixture to the burner is mounted outside the duct.

Firing rate is controlled by means of a single lever.

(AIRFLO Gas Burner System is product of Maxon Premix Burner Company, Dept. P&PSE, 201 East 18th St., Muncie, Ind.)
Circle 9671 inside back cover.

Pneumatic vibrator delivers 16,000 lb of impact

Used principally on hoppers, large bins, and railroad car shake-out, seven-inch pneumatic vibrator delivers 16,000 pounds of impact.

The unit operates on 60 to 80 psi of air, and the 176-pound piston has an 1¼-inch stroke.

Vibrator speed and intensity can be varied according to needs, and unit can be rigged to operate continuously or intermittently.

Reciprocating action of the piston is air-cushioned for quiet operation on applications where noise is an objectionable factor.

Large pneumatic vibrator weighs 539 lb

Entire weight of the vibrator is 539 pounds.

(Model FAC pneumatic vibrator is manufactured by Cleveland Vibrator Company, Dept. P&PSE, Cleveland, Ohio.)
Circle 9672 inside back cover.

High pressure gage gives sharp reading of boiler level

Using the principle of light refraction, high-pressure boiler gage gives a sharp black and white water level reading with strong contrast similar to that of reflex gages used with lower pressures.

The gage uses a steel plate at both the front and back which is perforated with a line of small, closely spaced holes up and down the 12-inch visible range.

A flood light illuminator at the back of the gage passes light rays through an angular passage, and while the light passing through the water is refracted and lost to view, the light passing through the steam area shines brightly through the front line of holes above the water level. The effect is similar to that of a reflex gage, giving a clearly marked separation between the black of the water level and the brightly lighted line above. It is highly visible from a distance and from an angle up to 20°. It is heavily constructed for working pressures to 3000 psig.

Maintenance is practically eliminated — there is no glass to break by thermal shock or uneven torquing. Mica strips are used to retain the internal pressure and provide transparency for the passage of light.

(Refragage boiler gage is manufactured by Jerguson Gage & Valve Co., Dept. P&PSE, 80 Adams St., Burlington, Mass.)
Circle 9673 inside back cover.

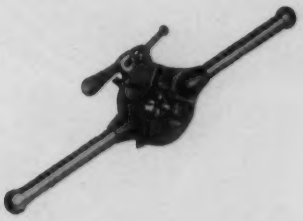
Speeds bolt threading

Just one die head for all ¼", 5/16", ⅜", 7/16", ½", 9/16", ⅝", ¾", ⅞" and 1" bolt dies is possible with compact bolt threader. Set of four full-width dies of desired size is easily inserted in die head and can't fall out.

Loosening of locking lever gives quick, fool-proof setting of easy-to-read size bar for standard, over- or under-sized thread.

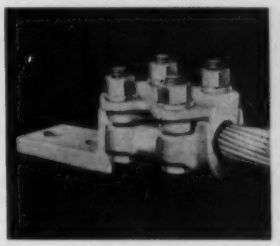
Fast removal of threader from bolt without stopping drive is obtained with quick-opening lever which retracts dies.

Two sturdy handles give sure grip, sure thread starts and plenty of leverage for hand use.



Quick-opening lever retracts dies for quick removal from bolt

(No. 101 Quick-Opening Bolt Threader is product of The Ridge Tool Company, Dept. P&PSE, Elyria, Ohio.)
Circle 9674 inside back cover.



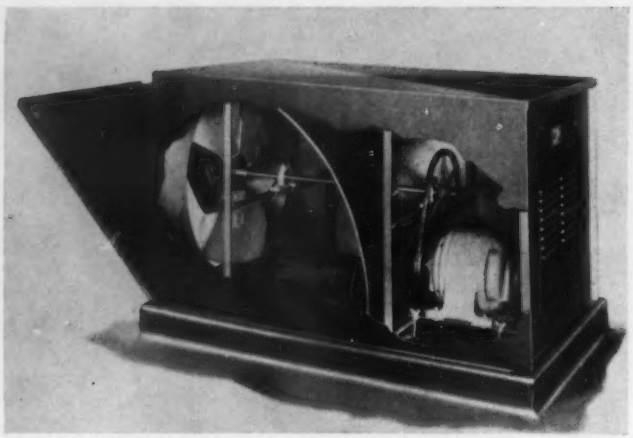
Terminals . . .

. . . for cable-to-flat connections to aluminum or copper have been designed to reduce number of sizes and types for the user to stock. Only 8 terminal sizes cover every cable size from No. 8 through 2000 MCM copper and aluminum or 1780 MCM ACSR. A single connector size will take as many as 35 different cable sizes. A modified V-groove, with wiping action that removes oxide film, assures high conductivity.

(NAR-A connector terminal is product of Burndy Corporation, Dept. P&PSE, Norwalk, Conn.)

Check 9675 on Reader Service Card.

Roof ventilators are completely packaged



Two-compartment design provides safety and easy access for service and adjustment

Wherever air must be exhausted against medium static resistance, it can be done efficiently and economically with completely packaged roof ventilator available in a wide range of sizes.

Two models are available — one is equipped with spark-proof aluminum-alloy high-speed propeller. The other utilizes a wide blade, slow-speed propeller.

The electric motor is entirely isolated from the air stream. Grease, dirt, explosive or corrosive fumes moved by the fan cannot come in contact with the motor, controls or drives.

The two-compartment design also provides easy access for service and adjusment. The units are constructed of heavy-gauge galvanized steel with a weatherproof hood protecting the fan opening.

Automatic shutters may be supplied in place of the cowl to provide complete closure when fan is not in operation.

Special acid-resistant coatings are available for chemical fume applications.

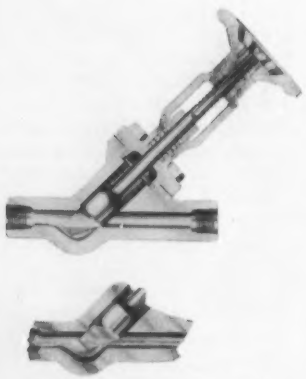
(L-Blow Roof Exhauster is product of Romla Company, Dept. P&PSE, 13101 South Main St., Los Angeles 61, Calif.)

Circle 9676 inside back cover.

Less turbulence and friction in control valve

Having a K-factor of only 0.35, control valve is designed to allow flow to move in a direct and unrestricted straight line at all throttling positions. This reduces pressure drop and friction loss while giving infinitely variable throttling

This also allows the valve to pass more fluid for a given pressure with less turbulence. Installation of the valve has increased the capacity of some systems by as much as 20 percent overall.



Automatic control is available in either diaphram or cylinder actuator

The design also increases the valve's resistance to clogging. Since all of the flow is concentrated in a triangular-shaped orifice instead of in an annular ring as is the case with most throttling valves, it allows the passage of much larger particles at any given orifice.

Flow regulation is accomplished by raising or lowering the stem which is placed at a selected angle to the flow. The stem has a 90°-milled groove in the tip, the apex of which is parallel to the direction of the flow.

The stem does not rotate, but moves up or down in an angle. As the stem rises, a larger section of the V-groove is presented as flow area. The flow passes through the groove parallel to the apex.

In this manner, the flow does not deviate from a straight line at any point in its path. Orifice opening is indicated on a calibration plate.

Valves are made in carbon steel, stainless steel and bronze. Pressure ratings are from 600 psi to 10,000 psi. Sizes available are ⅛" to 4."

Any style of packing is available to meet corrosive service.

Automatic control is available in either diaphragm or cylinder actuator. A special soft seat style is available.

(Straight-Flow Control Valve is product of General-American Valve Company, Dept. P&PSE, PO Box 444, Corona Del Mar, Calif.)

Circle 9677 inside back cover.

Shows relative humidity electronically, is portable

Accuracy is ±5%

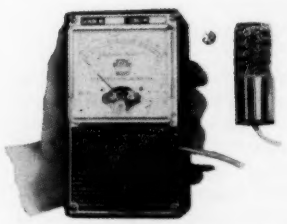
Giving almost instantaneous direct readings, portable instrument indicates relative humidity electronically from as far as 100 ft away. No tubes, conversion charts or thermometers are used.

The lightweight hygrometer is capable of indicating humidities from 30% to 95%, within a temperature range of 32°F to 180°F, by simply turning a knob. Accuracy is ±5%.

It can be used to detect harmful humidity levels wherever perishables are stored. In addition, it can determine humidity inside difficult locations, such as stacks of paper, bins, etc.

A wide variety of probes are available. They can be furnished in regular shapes or in long, flat shapes to handle special interior applications.

The hygrometer has a sensitive AC electronic circuit with a meter housed in a sturdy case. The panel control has a three-position switch: "Check", "Off", and "Read." When set in a check position, the meter reading is adjusted to 100% to compensate for any variations.



Just turn dial to indicate relative humidity up to 100 ft away

A temperature correction factor for registering above or below 82°F is listed on the instrument. Otherwise, the results in percent of relative humidity are read directly from the meter.

("Electro-Hygrometer" is product of Labline, Inc., Dept. P&PSE, 3070-82 W. Grand Ave., Chicago 22, Ill.)

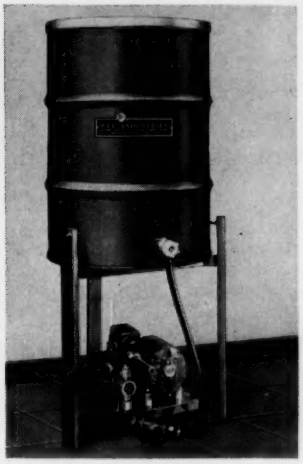
Circle 9678 inside back cover.

Pump and tank combo for boiler water treatment

Accurately feeds chemicals

Designed to use minimum of space, pump and tank combination offers accurate and efficient chemical feeding for boiler water treatment.

The 55-gal steel support drum containing a molded polyethylene tank for the chemicals is mounted atop a three-legged angle-iron frame. The pump, with its



55-gal support contains polyethylene drum

strainer, fittings and hoses, is mounted on cross members of the frame.

Entire unit stands 53" high. The tank, fittings and tubing are all made of corrosion-resistant materials suitable for handling most industrial chemicals.

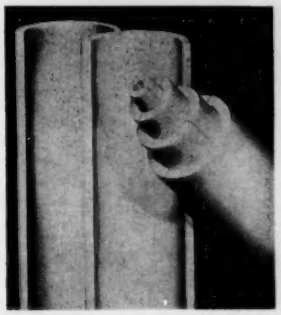
Other features include "Vane Guide" check valves with immediate cutoff, interchangeable, high-efficiency measuring cylinders, full-size reduction gears, and two types of fluid-end construction for handling various liquids.

Pumping capacity is up to 50 gph for discharge pressures up to 1100 psig. Accuracy is plus or minus 1% of the set rate over a 15:1 range.

(Pump-Tank Combo is product of B-I-F Industries, Inc., Dept. P&PSE, 345 Harris Ave., Providence 1, R.I.)
Circle 9679 inside back cover.

Low-temp pipe insulation

Urethane-foam pipe insulation is suited for use at temperatures ranging from −300°F to plus 220°F. The insulation is a closed-cell synthetic with excellent heat and chemical resistance, and it will not burn.



Urethane-foam insulation has K factor of 0.14 at 70°F

Thermal conductivity tests have shown it to have a K factor of only 0.14 at 70°F mean temperature.

A closed cell content of 85% plus gives it a high degree of resistance to water and vapor. Density is 2.3 lb per cu ft. Despite its light weight, it has high compressive and flexural strength.

The insulation can be cut and applied with standard tools and is non-toxic and non-irritating.

It is available in half-round sections of nominal thicknesses in standard pipe sizes. Individual sections are 36" long.

(UNARCO, U-200 is manufactured by Union Asbestos and Rubber Company, Fibrous Products Division, Dept. P&PSE, 1111 W. Perry St., Bloomington, Ill.)
Circle 9680 inside back cover.

Time control works on 7-day schedule; each day separate

For control of heating, ventilating, lighting and air conditioning in buildings and factories, 7-day time control allows a weekly schedule with individual settings.

The device not only separates each day of the week but also day and night periods. Any electrically controlled system can be turned on or off automatically at different hours of each day, or certain days can be omitted entirely. Settings made in advance for the entire week can be quickly changed on a moment's notice.

The entire switch mechanism can be removed from the case by merely pressing a spring lock.

No special tools or equipment are required.

Control separates each day of the week into day and night periods

Four-pole construction permits the switch to be used for all switching combinations — SPST, DPST, SPDT, and DPDT.

The switch also contains a manual "skip-trip" which consists of a hand trip which can transfer switch operations at any time without disturbing the daily or weekly tripping schedules.

Other features include: isolated contacts, with as many as four different voltages controlled by a single unit; 40-amp switching mechanism; and easy-to-read-and-set dial.

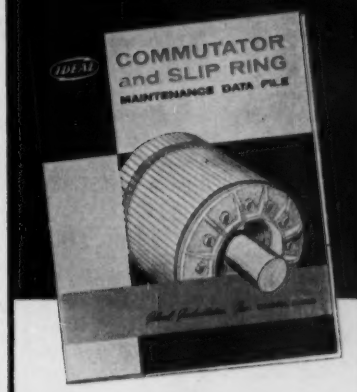
(7000 Series time control is manufactured by Paragon Electric Company, Dept. P&PSE, Two Rivers, Wisconsin.)
Circle 9681 inside back cover.

FREE

NEW SERIES

HOW-TO-DO-IT ARTICLES

on Commutator and Slip Ring Maintenance



Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

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Circle 9682 inside back cover.

NEW LITERATURE

for effective plant and power services operation

Reviews of books and industrial bulletins describing equipment, supplies, services

Electro clutch line described in full

Application information on electromagnetic clutches in six series with torque capacities from 1.8 through 13,000 pound-feet is provided in 20-page bulletin.

Applications include such machine tools as grinders, drill presses, boring mills, milling machines, and lathes; such general equipment as industrial washing, pulverizing, printing and packaging machinery; and specialized equipment including conveyors, welders, wind tunnels, radar antennas, test equipment and nuclear control mechanisms.

The bulletin provides general information on design advantages, clutch selection for a specific application, operating characteristics, and covers the six series of clutches, including the newly introduced stationary-field units, in separate sections.

(Bulletin R-6304-1B is available from I-T-E Circuit Breaker Co., Dept. P&PSE, 1900 Hamilton St., Philadelphia 30, Pa.)
Circle 9683 inside back cover.

Condensed data on condenser tube

Heat exchanger tube alloys for use in the power, marine and related fields are treated in condensed 8-page brochure.

Principal features, technical information and composition and applicable specifications are all included.

(Heat Exchanger Tube Brochure is issued by Scoville Mfg. Co., Mills Division, Dept. P&PSE, 99 Mill St., Waterbury 20, Conn.)
Circle 9684 inside back cover.

Offers two booklets on speed reducers

Two 24-page booklets contain detailed engineering data on shaft-mounted, in-line helical, and right-angle helical speed reducers.

Each booklet presents rating tables, selection procedures and other technical data useful to engineers specifying power transmission machinery.

(Booklet No. J-18 dealing with in-line and right-angle helical drives is available from Hewitt-Robins Incorporated, Dept. P&PSE, 666 Glenbrook Rd., Stamford, Conn.)
Circle 9685 inside back cover.

(Booklet No. J-19 describing shaft-mounted reducers is issued by Hewitt-Robins Incorporated, Dept. P&PSE, 666 Glenbrook Rd., Stamford, Connecticut.)
Circle 9686 inside back cover.

Drive-reversing coal conveyor

A self-clearing coal conveyor with two-way switch controlled motor that makes it possible to eject obstructions simply by reversing coal screw rotation is described in 4-page brochure.

Coal screws and flanged coal screw housings are made in matched sections and can be assembled to operate at any angle, with single or dual discharge chutes. Conveyors can also be specified for horizontal cross feed tandem or vertical operation.

Based on 48 lb coal, standard capacity is 2,500 lbs per hour.

(Coal Conveyor Bulletin is available from The Will-Burt Co., Dept. P&PSE, Orrville, Ohio.)
Circle 9687 inside back cover.

Heat transfer equipment — all kinds shown

Complete line of heat transfer equipment is described and illustrated in four-page condensed bulletin.

Equipment cataloged includes heat exchangers, fired indirect heaters, tank heaters, tank suction and line heaters, process heaters and coolers, packaged boilers, as well as custom-built equipment.

(Bulletin #593 is available from Brown Fintube Company, Dept. P&PSE, 514 Huron St., Elyria, Ohio.)
Circle 9688 inside back cover.

Drain or sampling valve catalog gives ratings

Catalog gives features, construction details, sizes, ratings and materials of drain or sampling valve.

The products utilize a unique bolted bonnet for "freeze-proof" action under all conditions.

(Data Unit No. 355 is issued by Jerguson Gage & Valve Co., Dept. P&PSE, 80 Adams Street, Burlington, Massachusetts.)
Circle 9689 inside back cover.

Feedwater control

Diagrammatic drawings show two-element and single-element air-operated feedwater control systems. A chart is included to aid in the selection of the proper system for each application.

(Bulletin 531 is available from Bailey Meter Company, Dept. P&PSE, 1050 Ivanhoe Road, Cleveland 10, Ohio.)
Circle 9690 inside back cover.

Fluorescent floodlights information given

Six-page bulletin describes line of fluorescent floodlights for all types of outdoor applications.

Rotating junction box which allows 360° aiming is diagrammed. Calculated light distribution and photometric data are listed.

(Bulletin GEC-1487 is issued by General Electric Company, Dept. P&PSE, Schenectady 5, N.Y.)
Circle 9691 inside back cover.

Brochure describes packaged boilers

Covering packaged boilers through 600 horsepower for heating and processing, steam or hot water, 12-page brochure highlights details from construction to final test and start-up service.

Included are a discussion of current design trends, burner design, automatic operation, efficiency ratings, and factory tests.

(CB Packaged Boiler Brochure is issued by Cleaver-Brooks Company, Dept. P&PSE, 326 East Keefe Avenue, Milwaukee 12, Wis.)
Circle 9692 inside back cover.

Shows corrosion-proof flooring materials

Flooring materials described in 4-page bulletin are said to give an economical monolithic corrosion-proof flooring. Installation can be made directly onto concrete slab or, in the case of an old building, can be applied on the existing floors to up-grade the surface.

The product can be used in such industries as food, drug, medicine, chemical, petroleum, metalworking and pulp and paper.

(Bulletin 3-4 is issued by Atlas Mineral Products Company, Dept. P&PSE, Mertztown, Pa.)
Circle 9693 inside back cover.

WHEN YOU PLAN...
TO SAVE COSTS
Factory-trained Cyclotherm engineers will . . . without charge . . . work with you from drafting board to final installation to estimate your steam demands.
TO SAVE TIME
Factory-trained Cyclotherm servicemen are as close as your telephone . . . at any hour of the day, night or week-ends.
TO SAVE SPACE
Cyclotherm Steam Generators range from 15 to 750 hp. . . . from 15 to 200 psi. For industrial and commercial establishments, shipping, institutions.
Select CYCLOTHERM STEAM & HOT WATER GENERATORS

Planning a new building? Remodeling an existing structure? As much as ⅓ smaller than other packaged units, the Cyclotherm Steam or Hot Water Generator allows more space for storage and production. Needs only a minimum-sized, minimum-cost boiler room. Or your Cyclotherm can be placed in a working area. Its radiant heat loss is at a minimum.

Lighter-weight, it costs less to transport. Simpler in design, it requires less rigging time . . . lower rigging costs.

Yet it delivers a guaranteed 80% efficiency . . . pays for itself in a few years in fuel savings alone . . . cuts maintenance costs up to 50%.

Exclusive, patented Cyclonic Combustion combined with simplicity of boiler design produces maximum heat transfer wringing every degree of heat from each fuel molecule . . . wasting none. Does in 2 passes what other combustion methods accomplish in 4. Cyclotherm's even rate of heat transfer eliminates localized, heat-retarding scale and "hot spots." All these features assure you of long life and maximum performance.

FREE **Discover how Cyclotherm can give you more steam for your dollar. RETURN THIS COUPON TODAY.**

YEARS AHEAD IN STEAM & HOT WATER GENERATION
CYCLOTHERM
STEAM AND HOT WATER GENERATORS
A Division of National-U.S. Radiator Corp., Oswego, N.Y.

Clip to Your Letterhead

Cyclotherm Division, National-U.S. Radiator Corp., Dept. 65, Oswego, N. Y.

☐ Please send me your illustrated folder on Cyclotherm Hot Water Generators.

☐ Please send me your illustrated folder on Cyclotherm Steam Generators.

Circle 9643 inside back cover.

NEW LITERATURE

Bronze and iron valve circular

Circular describes bronze and iron body gate, glove and check valves for heating, piping and air conditioning systems and includes valves with pressure ratings from 125 through 300 psi pressure ratings.

Application, basic design features and standard sizes are included for each valve description. In addition to the conventional screwed and flanged end valves, threadless valves for soldered or silver brazed connections are also shown.

(Circular No. 6 is issued by The Fairbanks Company, Dept. P&PSE, 393 Lafayette Street, New York 3, N.Y.)
Circle 9696 inside back cover.

Air conditioner packages shown

Eight-page, illustrated bulletin describes design and construction features of line of packaged air conditioners for industrial and commercial use.

Capacities and physical data are presented in tabular form covering both air-cooled and water-cooled designs.

(Bulletin 8525 is issued by Industrial Division, American-Standard, Dept. P&PSE, Detroit 32, Mich.)
Circle 9697 inside back cover.

Hydraulic, pneumatic symbols on chart

Reference chart, 8½ by 11 inches and suitable for hanging, is designed for ready reference to standard hydraulic and pneumatic symbols.

The chart is cross-referenced for all types of manufacturer's valves.

(Hydraulic and Pneumatic Symbol Reference Chart is available from Republic Manufacturing Company, Dept. P&PSE, 15655 Brookpark Road, Cleveland 35, Ohio.)
Circle 9698 inside back cover.

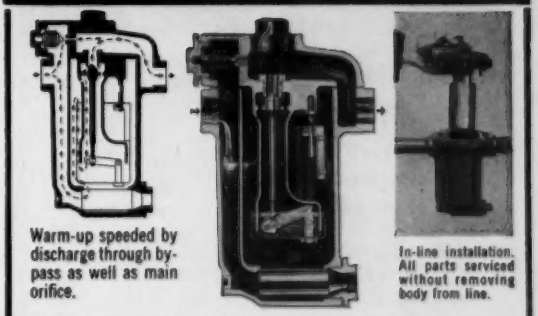
The basic horn (illustrated), with the addition of modular accessories also provides for flush installation, single or dual projector models, for surface mounting outdoors and for surface, semi-flush or concealed conduit installation indoors. The horn is self tuning, capable of withstanding continuous duty and may be adjusted for volume.

This horn can cover the majority of your signalling requirements. Ask for the FEDERAL Bulletin on the Vibratone.

FEDERAL SIGN and **SIGNAL** Corporation
13609 S. Western Ave., Blue Island, Illinois

Circle 9699 inside back cover.

Now—A Steam Trap that Adjusts Automatically to Every Operating Condition!



Warm-up speeded by discharge through by-pass as well as main orifice.

In-line installation. All parts serviced without removing body from line.

AUTOMATICALLY REGULATES FOR FASTER WARM-UP AND TO KEEP OPERATING TEMPERATURE AT PEAK HEAT

Proven bucket design with built-in accessories. By-pass thermostat increases discharge for warm-up and overload conditions. Thermostat compensated to operate at 10° below saturated steam temp. Wright-Austin Airxpel principle provides for mechanical discharge of air after Thermostatic by-pass has closed.

WRITE FOR BULLETIN 808

WRIGHT-AUSTIN COMPANY
3245 WIGHT STREET • DETROIT 7, MICH.

Circle 9700 inside back cover.

Insulation adhesive specifications

Complete line of insulation adhesives is specified in four-page bulletin. Products covered include: lagging adhesives, bonding adhesives, and facing, jacket and hanger adhesives.

Beside brief descriptions, handy chart gives coverage range, bonding time, temperature limits, flash point, flame spread index, solvent for clean-up, and average non-volatile content information for 25 products.

(Bulletin ARC is available from Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pennsylvania.)
Circle 9701 inside back cover.

For accurate feeding boiler chemicals

A plunger-type, small-capacity proportioning pump for accurate and efficient treating of small, low-pressure boilers is subject of two-page bulletin containing engineering and dimensional data and a list of boiler water treatment chemicals handled.

Pump is adjustable from 0.2 to 2 gph at 300 psi maximum.

(Bulletin No. 1107.20-1 is issued by B-I-F Industries, Inc., Dept. P&PSE, 345 Harris Ave., Providence, R.I.)
Circle 9702 inside back cover.

For operating slip stem valves

Motor — with integral strain release and yoke assembly — operates a wide range of slip stem valves.

The motor is described and pictured in eight-page folder, containing six pages of specification data.

(Specification S1016-2 is available from Minneapolis-Honeywell Regulator Company, Industrial Division, Dept. P&PSE, Wayne and Windrim Avenues, Philadelphia 44, Pa.)
Circle 9703 inside back cover.

Gas scrubbers for any job

Eight-page bulletin features high efficiency, direct-contact gas scrubbers for removal of particulate matter, including sub-micron dust and fume, and absorption of gases and vapors. Capacities range from 100 to 250,000 cfm.

Selective agglomerating and cleaning stages handle slurries used for scrubbing liquid. Both stages are within a single shell. Principles of the multi-jet impingement baffle close-contact stage and agglomerating slot stage are described and illustrated.

Some scrubbers are custom-engineered to fit specific processes, others are shop-assembled package units. While cooling and purifying gases they also may recover product and control atmospheric pollution. Applications range from cleaning incinerator flue gases to treatment of radioactive wastes.

(Bulletin 203-C is issued by Peabody Engineering Corp., Dept. P&PSE, 232 Madison Ave., New York, N. Y.)
Circle 9704 inside back cover.

Polyurethane info

Castable polyurethane rubber is described in brochure for the information of design, development and research engineers.

Described as a new molecular composition for practical applications in areas that heretofore were beyond the ability of rubber products, the rubber in pure gum form, is harder than most conventional rubber compounds and has from two to four times the strength.

The rubber compound can be cast into shapes that would be impractical for other elastomers. Neothane is liquid during manufacture and has few limitations on shapes, irregular contours or fine details.

Future applications include bearings, belts, bushings, couplings, drives, gaskets, gears, hangers, mounts, packings, pads, plungers, pulleys, rotors, seals, supports.

(Brochure S-5125 is available from Goodyear Tire & Rubber Co., Dept. 794, Akron 16, Ohio.)
Circle 9705 inside back cover.

PLANT and POWER SERVICES ENGINEER

"... By pointing the concave mirror toward the sun ..."

Steam generator

Four-page bulletin presents information and cut-aways of various components of unit steam generator.

The fully automatic unit is available for various fuels — light oil, heavy oil, gas, and combination gas-oil.

(Bulletin No. 3000 is issued by Preferred Utilities Manufacturing Corporation, Dept. P&PSE, 41 East 42nd St., New York 17, N.Y.)
Circle 9706 inside back cover.

Bulletin describes pump concept

A folder describing standardized vertical single stage pump that covers the range of 1″, 1½″, 2″, 3″ and 4″ pumps has been issued.

Applicable to general industrial operation, the pump is said to be economical because the size of the pump is always the same regardless of the head capacity requirements. Spare parts inventories can be held at a minimum owing to the reduced number of parts within the unit.

(Folder "Veriflow Pump" is issued by United Centrifugal Pumps, Dept. P&PSE, 580 Second Street, Oakland, California.)
Circle 9707 inside back cover.

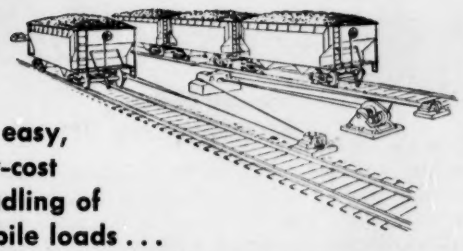
Heat transfer cement technical data

Properties and uses of heat transfer cements are given in 38-page engineering data book.

The information is divided into four main topics under the headings: General Information, Engineering Data and Calculations, Estimating and Installation Data, and Useful Engineering Data.

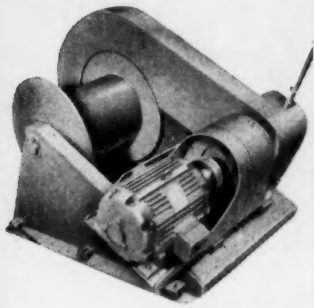
Numerous charts and tables are presented under the various headings.

(Engineering Data Book 502 is available from Thermon Manufacturing Company, Dept. P&PSE, PO Box 1961, Houston 19, Texas.)
Circle 9708 inside back cover.



For easy, low-cost handling of mobile loads . . .

LINK-BELT *DRUM-TYPE* CAR PULLERS



Powerful enough to move 20 loaded freight cars (1000 tons), Link-Belt car pullers bring ease and economy to heavy haulage jobs. They're ideal for a wide variety of applications . . . moving freight cars and barges, dragging loaded skids, pulling materials in and out of furnaces, kilns, ovens.

Available *from stock* with single or double drums . . . in many types and capacities.

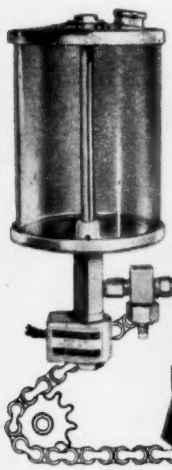
SEND FOR *NEW* BOOK 2892

LINK-BELT

CAR PULLERS AND CAR SPOTTERS

LINK-BELT COMPANY: Prudential Plaza, Chicago 1, Ill. 15,230

Circle 9709 inside back cover.



DOUBLE CHAIN LIFE!

Install Oil-Rite Automatic CHAIN OILERS

Here's the *low-cost answer to chain breakdowns* caused by link-wear, stretch, corrosion and friction. OIL-RITE Chain Oilers feed oil by gravity through solenoid and sight feed valve to brush which rides the chain. Solenoid *starts and stops with driving motor*, making operation automatic, oiling only when chain moves. Drop feeding adjustable. 9 oz. — 1 gal. in capacity with brushes to suit your chains.

GIVE YOUR PLANT ALL THESE BENEFITS!

- Safe, sure chain lubrication
- Reduce chain wear
- Eliminate costly hand oiling
- Cleaner, less hazardous floors

Many styles of Electro and Manual Chain Oilers available. Write for Free Bulletin.

Oil-Rite CORPORATION

2396 WALDO BOULEVARD
MANITOWOC, WISCONSIN

Oil Cups • Dispensers • Oiling Systems • Valves • Oil Gages • Chain Oilers

Circle 9710 inside back cover.

CUT HERE AND FILE

Flashing of water to steam

R. L. PATTON
Equipment Design & Selection
Gulf Oil Corporation, Port Arthur, Texas

This nomograph provides an easy and quick method for determining the percentage of water flashed to steam in a flash tank or other equipment without the need of a steam table. It is derived from the following formula, and its construction is empirical and based on data from the steam tables:

$$\% = \frac{H_1 - H_2}{H_L} \times 100$$

where

H_1 = heat of liquid at initial pressure, Btu/lb

H_2 = heat of liquid at final pressure, Btu/lb

H_L = latent heat of vaporization of final pressure, Btu/lb

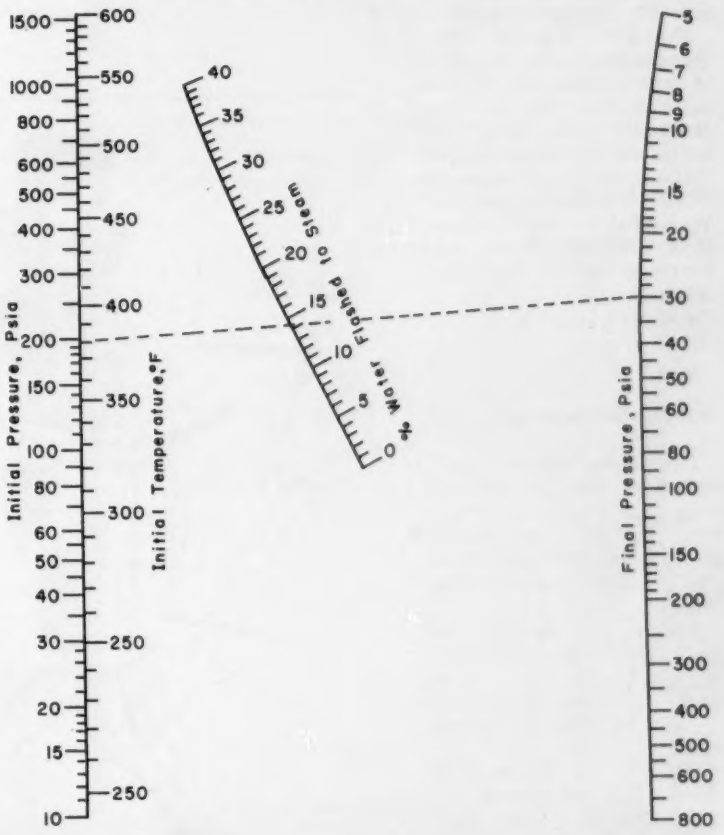
Typical Example

In the example shown by the dotted line, the water is initially at 380°F and is flashed to 30 psia. The percent water flashed to steam is 14.2% read from the chart.

By calculation with heat values:

% = (353.45 − 218.82) (100)/945.3 = 14.2%

Where the water is initially at saturation temperature, either the pressure or the temperature scale may be used. If the water is at less than saturation temperature, the temperature scale must be used.



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Packaged disconnecting switches shown

Packaged disconnecting switches for sectionalizing and isolating applications are featured in 2-page bulletin.

The switch can be installed in either vertical or horizontal position. Complete dimension and rating data is given on the switches which are rated from 7.2 to 69 kilovolts and 400, 600, or 1200 amperes.

(Packaged Disconnecting Switches Bulletin GEA-6962 is issued by General Electric Co., Dept. P&PSE, Schenectady 5, New York.)
Circle 9711 inside back cover.

Dust collector accessory data

Data and information on dust collector accessories are given in information sheet containing illustrations, drawings and specifications.

The wide range of accessories is designed to give users of cyclone separator and cabinet cloth filter dust collectors practically "tailor-made" installations at minimum cost.

(Dust collector accessory bulletin is available from Torit Manufacturing Company, Dept. P&PSE, Walnut and Exchange Sts., St. Paul, Minnesota.)
Circle 9712 inside back cover.

Double row bearings

Double row ball bearings — including open, shielded and snap ring types with dimension and load specifications for both light and medium series — are described in 4-page bulletin.

Double row bearings find most frequent use in applications requiring heavy radial loads, moderate thrust, shaft rigidity and limited housing area.

(Bulletin 111 is issued by Hoover Ball and Bearing Co., Dept. P&PSE, 5400 South State Road, Ann Arbor, Michigan.)
Circle 9713 inside back cover.

How to apply adhesives

Series of two-page bulletins tell how to apply insulation adhesives for a variety of applications.

(Bulletin A-1-A on bonding insulation to air ducts is issued by Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pa.)
Circle 9714 inside back cover.

(Bulletin A-1-B telling how to apply lagging to indoor insulated piping, fittings and equipment is available from Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pennsylvania.)
Circle 9715 inside back cover.

(Bulletin A-1-C describing how to get a vapor-barrier jacketing on insulated ducts and piping is issued by Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pa.)
Circle 9716 inside back cover.

Refractory data

As an effective guide to basic product selection, use, application and service, two bulletins present technical data on a chrome-base, air-setting refractory bonding mortar and a dry, air-setting chrome-ore castable refractory.

Information on these products is classified under several headings: What it is, Where used, How to apply, Estimating requirements, and Where to buy.

(Bulletin 72 on chrome castable refractory is available from Refractories Division, H. K. Porter Company, Inc., Dept. P&PSE, Porter Building, Pittsburgh 19, Pa.)
Circle 9717 inside back cover.

(Bulletin 73 on chrome-base mortar is issued by Refractories Division, H. K. Porter Company, Inc., Dept. P&PSE, Porter Building, Pittsburgh 19, Pennsylvania.)
Circle 9718 inside back cover.

Low-cost boiler water treatment

The use of di-sodium phosphate for low-cost boiler water treatment is described in technical bulletin.

Methods of external and internal application of di-sodium phosphate to control scale formation in boilers in addition to physical and chemical description of the product are given.

(Technical Bulletin I-171 is available from the Inorganic Chemicals Division, Monsanto Chemical Co., Dept. P&PSE, 800 N. Lindbergh Blvd., St. Louis 66, Mo.)
Circle 9719 inside back cover.

Battery data

Only one-third the weight and one-fourth the size of ordinary batteries, long-life silver-cadmium cells are designed for wherever space and weight are critical.

Six-page bulletin supplies extensive data on physical and electrical characteristics, as well as numerous graphs comparing performance of this system with that of other types.

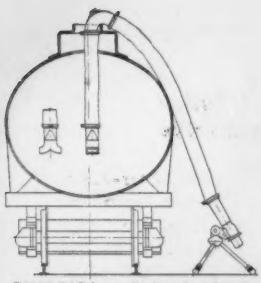
(Silcad battery bulletin is issued by Yardney Electric Corp., Dept. P&PSE, 40-50 Leonard St., New York 13, New York.)
Circle 9720 inside back cover.

Vertical turbine-type pump in bulletin

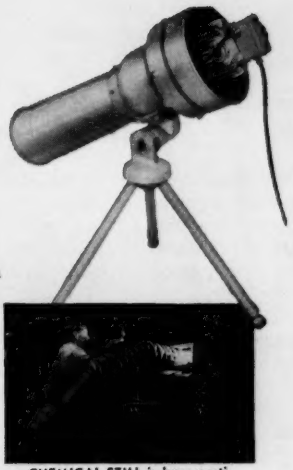
New vertical turbine-type bulletin describes their wide application. The pump, said to be a space saver, requires no priming, and various combinations of bowls and columns permit fitting a unit for any condition. Its simple design makes for low maintenance and low initial cost.

The pumps are available in 40 sizes, 20 to 8000 gpm at heads to 400 ft or more.

(Bulletin 08B9409 "Vertical Turbine-Type Pumps" is issued by Allis-Chalmers, Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9721 inside back cover.



TANK CAR is easily freed of fumes for workers' safety.



CHEMICAL STILL is here ventilated while being repaired.

KEEP AIR FRESH

in confined places with COPPUS *Design "A" Ventilator*

Improve workers' safety—health—comfort—efficiency. Get rid of dangerous gases, fumes, stagnant air. Coppus Design "A" Ventilator ventilates tanks, tank cars, drums, vats, underground cable manholes, pipe galleries, airplane wing compartments, fuselages. For complete information, write Coppus Engineering Corporation, 191 Park Ave., Worcester 2, Mass. Sales Offices in *Thomas' Register.*

Other "Blue Ribbon" Products in *Chemical Engineering Catalog, Refinery Catalog, Best's Safety Directory* and *Mining Catalogs.*

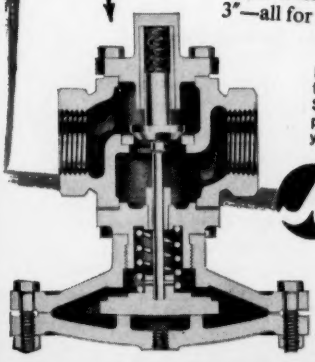
ANOTHER COPPUS "BLUE RIBBON" PRODUCT

Circle 9722 inside back cover.

Valve assembly floats

...in this JOHNSON DIAPHRAGM VALVE

Yes, this diaphragm valve has the same floating-action valve assembly perfected in Johnson Solenoid Valves. Valve seat is not tied to push rod...is free to find its own leak-tight seat with each closing. Ideal for steam and water service. Designed especially to team up with Johnson Solenoid Valves ...to provide a quick-acting, heavy duty automatic valve for high-pressure large-capacity requirements. Sizes 2", 2½" & 3"—all for pressures to 250 psi.



New Bulletin "V" has full data on Johnson Solenoid and Diaphragm Valves; write for your copy.

THE JOHNSON CORPORATION
807 Wood Street
Three Rivers, Michigan

Circle 9723 inside back cover.

CUT HERE AND FILE

Plant-Power Services Engineer

nomograph 40

Plant ventilation fan requirements

HARRY L. BRYMAN
Brooklyn 26, N.Y.

This chart is derived from the basic equation referred to in the handbooks:

$$P = \frac{1.57 \times 10^{-4} Ah}{E}$$

where

P = Horsepower
A = Air moved, cu ft/min
h = Air pressure, inches of water (static or total)
E = Fan efficiency (static or total)

The term h may be either static pressure or total pressure in which case E represents static efficiency or total efficiency respectively.

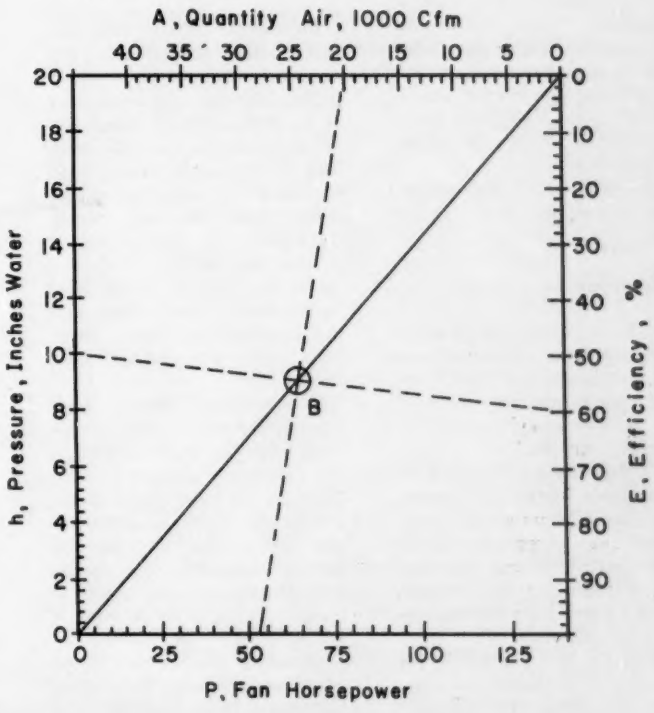
In any one fan, the ratio of total to static pressure remains constant at rated capacity, but will vary for different types.

The chart is really a combination of two relationships — Pressure to Power, and Air Quantity to Efficiency — and, therefore, can be combined into one diagonal. Any of the quantities can be found if the other three are known.

Typical Example

Find the power for fan supplying 20,000 cfm at pressure of 10 inches with efficiency of 60%.

Connect 10 on h scale with 60 on E scale by straight edge to intersect diagonal at B. Through point B and 20 on the A scale, draw straight line and extend to P scale. This gives a reading of 53 which checks closely with 52.6 found by mathematical means.



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November, 1959

Large-capacity coal-fired packaged boiler

Eight-page bulletin fully describes a coal-fired packaged boiler available in standard sizes of 43,000, 50,000 and 63,000 lb of steam per hour with pressures up to 250 psig.

Details concerning the unit's components, its construction and performance characteristics are given.

(Bulletin PG-59-4 is issued by Foster Wheeler Corporation, Dept. P&PSE, 666 Fifth Ave., New York 19, N.Y.)
Circle 9724 inside back cover.

Select right dust or mist collector

Essential information for selecting a dust or mist collector along with actual in-plant photos is given in one-page brochure.

All essentials such as type and number of grinding, buffing, polishing or woodworking machines each model can service are given. It also includes detailed descriptions of frequently used accessory equipment, such as filter shakers, and their applications.

(Mistkop Brochure is issued by Aget Mfg. Company, Dept. P&PSE, Church Street, Adrian, Mich.)
Circle 9725 inside back cover.

Turbine pump motors

Turbine pump motors catalog shows cross-section of motor, said to be the "first vertical pump motor designed for short-coupled industrial pumping service."

Various design features of the pump's integral construction that eliminate the usual spacer base, gives easy access to the coupling, and provides the strength for the bracket rigidity needed for direct coupling are shown.

(Bulletin No. F-1975 is issued by U.S. Electrical Motors, Inc., Dept. P&PSE, PO Box 2058 Terminal Annex, Los Angeles 54, Calif.)
Circle 9726 inside back cover.

Much info on heavy duty electric hoists

Heavy duty electric hoists ranging from ¼ ton to 12-ton capacity are available for use on job cranes, gantry cranes, single and double girder bridge cranes, as well as special monorail track or standard I-beam. Thirty-four page catalog also describes stationary hoist, electric car pullers and cabs for trolley hoists.

Dimensional drawings and detailed specifications cover capacity of hoist, speed and height of lift, dimensions of beam, type of hoist suspension, controls, current supply and operating conditions.

(Catalog No. H-59 entitled "LO-HED Electric Hoists," is issued by American Engineering Co., Dept. P&PSE, Wheatsheaf Lane and Sepviva St., Philadelphia 37, Pa.)
Circle 9727 inside back cover.

Internal vent condenser featured in bulletin

Feedwater heaters with internal vent condensers are shown in 2-page bulletin.

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Contaminated steam and non-condensable gases liberated from the water heated in the deaerating section pass up through the inner walls of the condenser. Here a series of alternating fins absorbs the heat, condenses the steam, and allows air and gases to escape through an automatic air vent valve at the top.

(Bulletin SI-317 is issued by Stickle Steam Specialties Company, Dept. P&PSE, 2215 Valley Avenue, Indianapolis 18, Ind.)
Circle 9728 inside back cover.

How to get continuous power and light

Four-page illustrated bulletin highlights relay control features of automatic transfer switches designed for service to 600v, 800a with interrupting capacities to 50,000a rms.

The device incorporates a dual circuit breaker design that permits power to be mechanically transferred by a common motor-driven linkage.

(Bulletin 07500-G is issued by Lake Shore Electric Corp., Dept. P&PSE, 205 Willis St., Bedford, Ohio.)
Circle 9729 inside back cover.

H-V handling tool catalog features selector guide

High-voltage handling tool catalog features a selector guide for high-voltage power fuses, cutouts, switches and load interrupters.

The selector guide shows the suitability of each high-voltage tool for each class of equipment in terms of "good," "fair," "not applicable," and "do not use." Fifteen basic tools for utility, industrial plant and commercial building interrupting equipment are described as to construction and operation.

(Bulletin No. 823 is available from S&C Electric Co., Dept. P&PSE, 4435 North Ravenswood Ave., Chicago 40, Illinois.)
Circle 9730 inside back cover.

Non-clogging spray nozzles

Four-page brochure gives detailed information on a quick-clamp-on non-clogging spray nozzle as well as the standard U-bolt type.

Tables cover dimensions, nozzle discharge vs pressure, spray width and specifications along with installation instructions for both types.

(Folder 2986 is available from Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Ill.)
Circle 9731 inside back cover.

Catalog describes fuel control valve

Adjustable cam, lever-operated control valve maintains accurate flow-pressure drop ratios for oil, steam, water, air and gas pressures to 300 psi.

The instrument is used chiefly to control the flow of fuel to a burner in response to instrument control. The booklet recommends the valve in place of conventional non-adjustable or linear adjustable lever-operated control valves for such applications as controlling the flow to oil or gas burners and also as a metering valve for fluid handling in any process industry.

(Section IV Catalog sheet is issued by Atlas Valve Co., Dept. P&PSE, 280 South Street, Newark 5, N. J.)
Circle 9732 inside back cover.

Easy way to read O_2 in boiler water

Testing of low concentrations of dissolved oxygen in boiler feedwater can be performed easily by inexperienced operators with test unit discussed in two-page bulletin.

More than 900 tests can be performed with the chemicals supplied in the colorimetric test kit which is accurate to within two ppb of oxygen.

(Bulletin HSP-916 is issued by Hagan Chemicals & Controls, Inc., Dept. P&PSE, Hagan Building, Pittsburgh 30, Pennsylvania.)
Circle 9733 inside back cover.

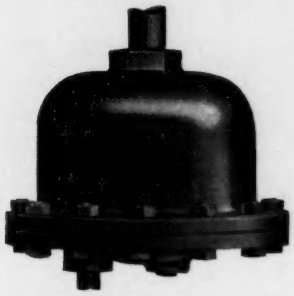
Cable tray shown

Tray for continuous support of control and power cables and tubing permits dropping out of control cables and tubing anywhere in the run.

Two-page bulletin gives full details on galvanized steel and aluminum types.

(Catalog No. 858 is issued by P-W Industries, Inc., Dept. P&PSE, 11200 Roosevelt Blvd., Philadelphia 15, Pa.)
Circle 9734 inside back cover.

TRAPS 2566



COMPRESSED AIR

Murphy Ball Float Traps, Inverted Bucket Traps, Zip Action Traps, and Thermotraps provide automatic ejection of condensate for any pipeline capacity or pressure, and regardless of atmospheric temperature.

Write now for FREE Data Sheet No. 2566.

JAMCO

JAS. A. MURPHY & CO., INC.
1419 EAST HIGH STREET, HAMILTON, OHIO

Circle 9735 inside back cover.

YOU CAN EARN 20 DOLLARS

BY HAVING A NOMOGRAPH IN

Plant and Power Services Engineer

PLANT and POWER SERVICES ENGINEER is looking for good nomographs designed to simplify calculations necessary to efficient plant and power services. If you have such a nomograph that has been helpful to you in your work — and it has not been published before — send it to:

Data Editor
PLANT and POWER SERVICES ENGINEER
111 E. Delaware Place
Chicago 11, Illinois

CUT HERE AND SAVE

Heating values of coal

RALPH S. OBERG
Salt Lake City, Utah

The lower or higher heating value of a fuel — when one or the other is known — can be easily determined by the accompanying nomograph which is based on the following equation[1]:

$$L = H - 1040(m + 9H_2)$$

where

L = Lower heating value, Btu/lb
H = Higher heating value, Btu/lb
m = Percent moisture/100
H_2 = Percent hydrogen/100

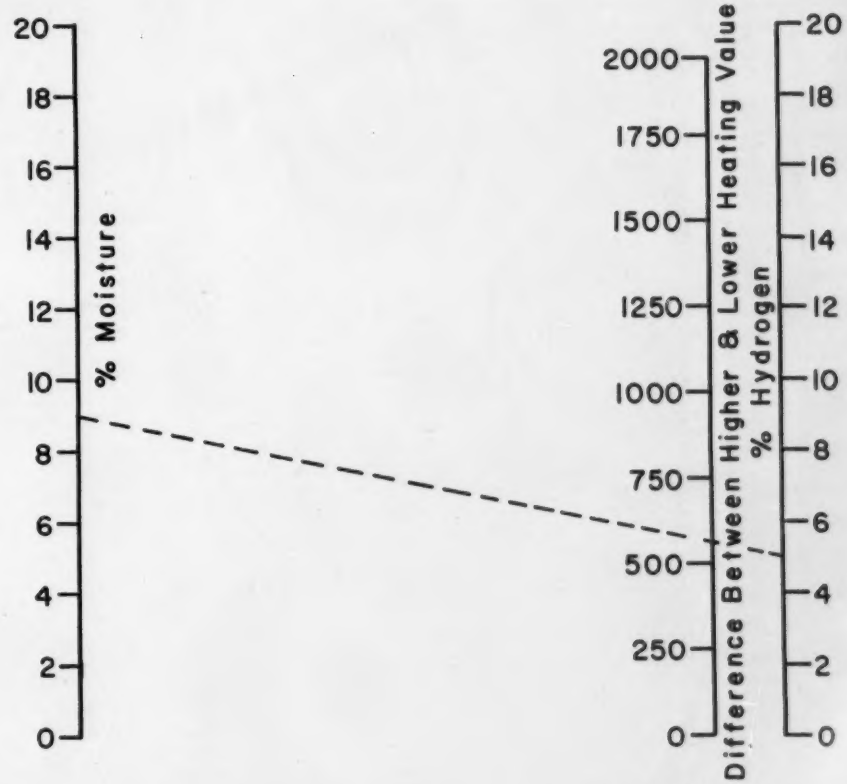
Typical Example

What is the lower heating value of coal if the higher is 13,500 Btu/lb and the ultimate analysis shows 9% moisture and 5% hydrogen?

Connect 9 on the moisture scale and 5 on the hydrogen scale and read 562. The lower heating value is determined by subtracting this number from the higher value, or lower heating value equals 13,500 − 562 or 12,930 Btu/lb.

LITERATURE CITED:

1) "Useful Tables for Engineers and Steam Users," Babcock and Wilcox Co., p 20, 1953.



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Large-capacity coal-fired packaged boiler

Eight-page bulletin fully describes a coal-fired packaged boiler available in standard sizes of 43,000, 50,000 and 63,000 lb of steam per hour with pressures up to 250 psig.

Details concerning the unit's components, its construction and performance characteristics are given.

(Bulletin PG-59-4 is issued by Foster Wheeler Corporation, Dept. P&PSE, 666 Fifth Ave., New York 19, N.Y.)
Circle 9724 inside back cover.

Select right dust or mist collector

Essential information for selecting a dust or mist collector along with actual in-plant photos is given in one-page brochure.

All essentials such as type and number of grinding, buffing, polishing or woodworking machines each model can service are given. It also includes detailed descriptions of frequently used accessory equipment, such as filter shakers, and their applications.

(Mistkop Brochure is issued by Aget Mfg. Company, Dept. P&PSE, Church Street, Adrian, Mich.)
Circle 9725 inside back cover.

Turbine pump motors

Turbine pump motors catalog shows cross-section of motor, said to be the "first vertical pump motor designed for short-coupled industrial pumping service."

Various design features of the pump's integral construction that eliminate the usual spacer base, gives easy access to the coupling, and provides the strength for the bracket rigidity needed for direct coupling are shown.

(Bulletin No. F-1975 is issued by U.S. Electrical Motors, Inc., Dept. P&PSE, PO Box 2058 Terminal Annex, Los Angeles 54, Calif.)
Circle 9726 inside back cover.

Much info on heavy duty electric hoists

Heavy duty electric hoists ranging from ¼ ton to 12-ton capacity are available for use on job cranes, gantry cranes, single and double girder bridge cranes, as well as special monorail track or standard I-beam. Thirty-four page catalog also describes stationary hoist, electric car pullers and cabs for trolley hoists.

Dimensional drawings and detailed specifications cover capacity of hoist, speed and height of lift, dimensions of beam, type of hoist suspension, controls, current supply and operating conditions.

(Catalog No. H-59 entitled "LO-HED Electric Hoists," is issued by American Engineering Co., Dept. P&PSE, Wheatsheaf Lane and Sepviva St., Philadelphia 37, Pa.)
Circle 9727 inside back cover.

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The internal vent condenser is a double-walled hood located at the top of the unit. The bottom wall of this hood serves three purposes: it deflects the incoming water downward; distributes it across the baffles and absorbs the Btu or latent heat in the contaminated steam and non-condensable gases liberated from the water being heated.

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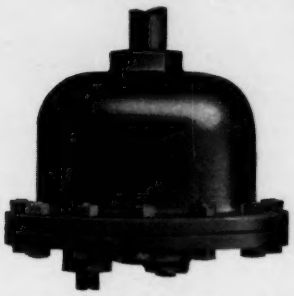

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CUT HERE AND SAVE

Heating values of coal

RALPH S. OBERG
Salt Lake City, Utah

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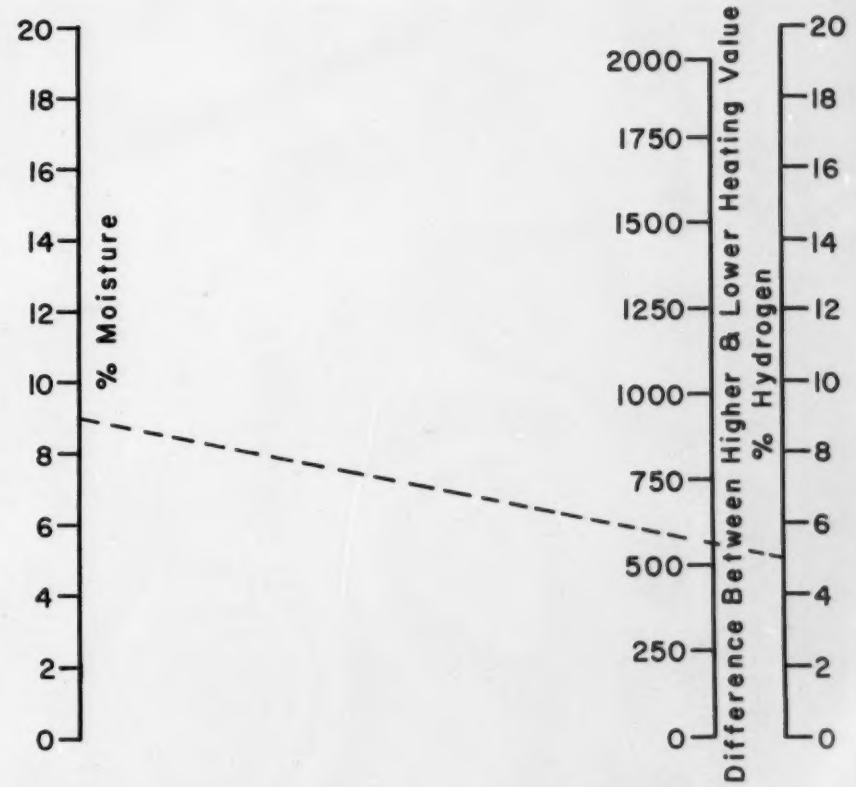

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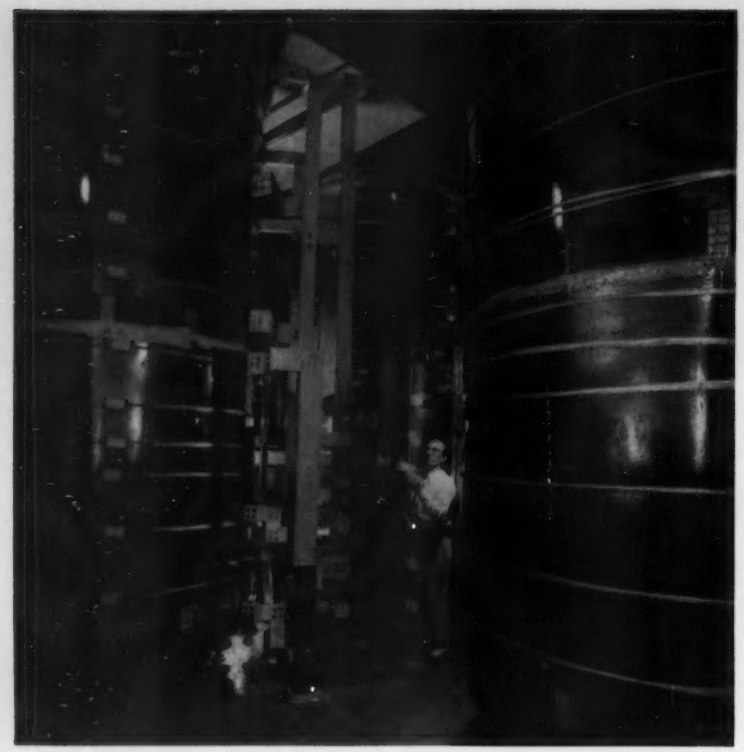
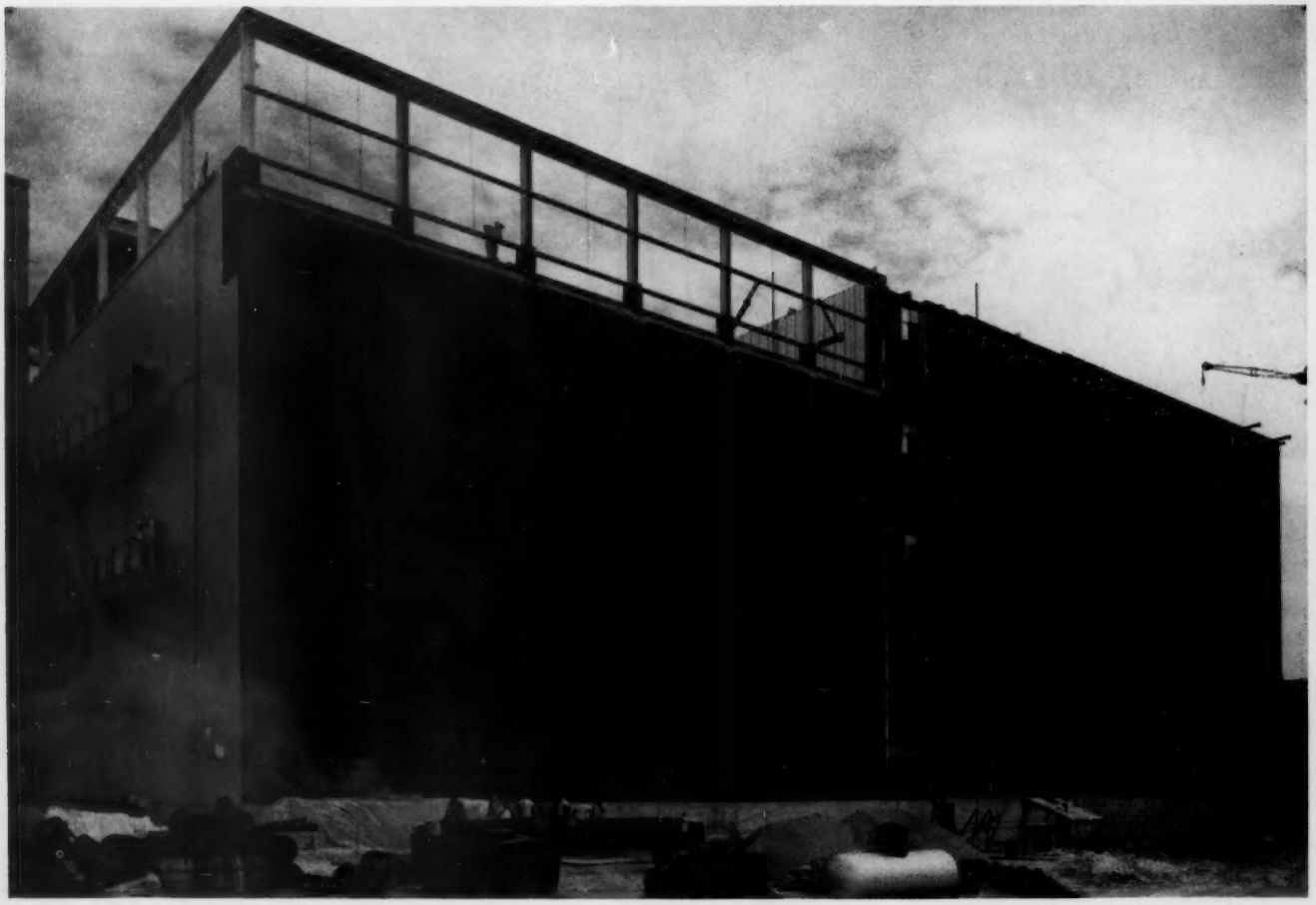
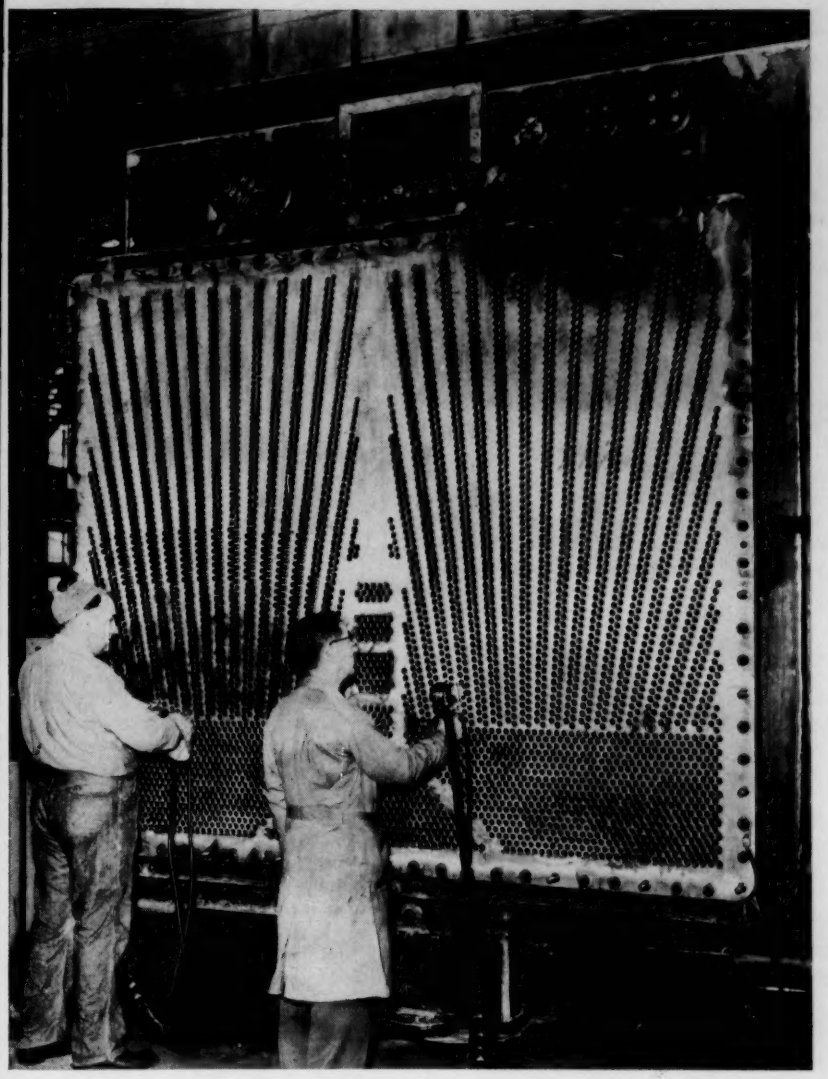
PHOTO NEWS



◀ SUBSTITUTION FOR A CITY is the job of this three-phase testing reactor recently installed by Westinghouse to study the thermal and electrical characteristics of high-capacity turbine-generators. The reactor gives excellent simulation of actual conditions by loading the machine at rated kva but zero percent power factor.

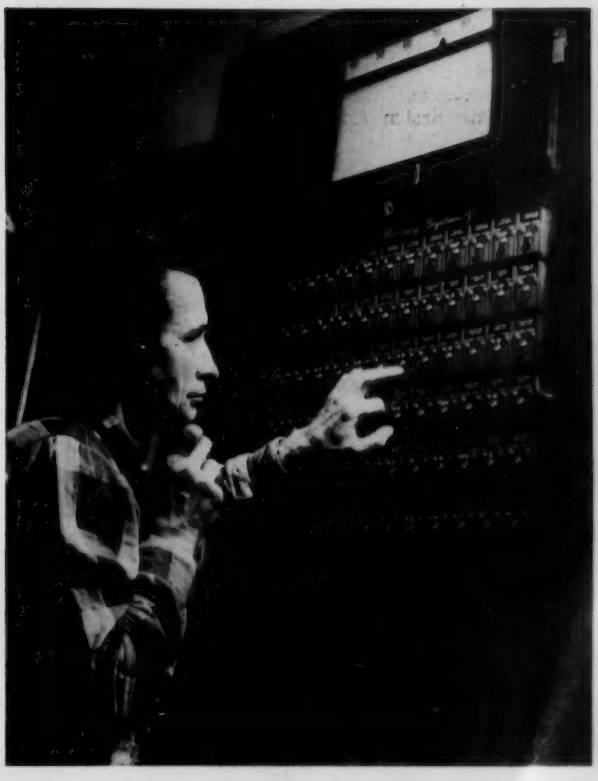
INSULATION — NOT MASONRY — BLOCKS were used to construct the walls of the Schlitz plant in Tampa, Fla. The insulation, a cellular-glass product of Pittsburgh Corning, has an ultimate compressive strength of over 7 tons per sq ft. Aluminum siding was used to cover the two layers of insulation and to give an attractive exterior appearance. ▼





HIGHER PURITY CONDENSATE will be the result of using 70/30 Cupro-Nickel for the tube sheets and tubes in the condensers of the N. S. Savannah. Another important factor in the use of the material was the lightweight automatic welding gun (shown being used here) developed by Revere Copper and Brass Incorporated to assure pressure-tight conditions for the atomic operation.

WHAT'S UP, DOC? With this portable x-ray equipment manufactured by the X-Ray Department of General Electric, inspection of pipeline sections and "window welds" can be easily made. The unit is shown here being used on a municipal central steam pipeline job.



"NOT WARM ENOUGH? OK, wait a minute," is the operator's report to the shop as he pushes a button on the central heating control panel at Westinghouse's East Pittsburgh works. Located in the main power plant adjacent to the switchboard, the control panel can start or stop steam in any area or shut down the entire system in one minute. By allowing one man to "patrol and control" the entire heating system, the central setup has been calculated to save 1300 man-days and 150 million pounds of steam per year.

Circular slide-rule calculates power factor

A circular slide-rule calculator designed for the engineer faced with power factor correction problems is available without charge. The calculator shows how many capacitor kvar's of correction to raise existing circuits are needed to meet utility minimum power factor requirements.

A handy reference table gives kvar required for correction of 3-phase, 60-cycle NEMA Classification B motors as well as the percent reduction in line current which may be achieved with the recommended correction.

(Calculator, Form No. AD-188, is available from Industrial Capacitor Section, Sprague Electric Company, Dept. P&PSE, Marshall Street, North Adams, Mass.)
Circle 9736 inside back cover.

Mechanical dust collectors

Drawings and application diagrams describe the involute design for mechanical dust collectors in technical bulletin.

Specific application of the involute design for handling abrasive dusts is reviewed in bulletin.

(Bulletin 300 is available from Research-Cottrell, Inc., Dept. P&PSE, Bound Brook, New Jersey.)
Circle 9737 inside back cover.

The grease story

Captioned photographs tell full story of company's research and manufacturing facilities for producing lubricating greases.

The eight-page bulletin also contains brief descriptions of grease line including non-soap, lithium and special greases.

(Bulletin AD-7600 is issued by Standard Oil Company (Indiana), Dept. P&PSE, Chicago 80, Ill.)
Circle 9738 inside back cover.

Plastic conduit specs given in bulletin

Six-page, fold-out bulletin gives detailed information for the selection of plastic conduit to handle electrical applications in corrosive and explosive atmospheres.

One page is devoted to illustrations and text on how to install the conduit and save on costs.

(Plastic conduit bulletin is issued by Southwestern Plastic Pipe Company, Dept. P&PSE, PO Box 117, Mineral Wells, Texas.)
Circle 9739 inside back cover.

Tubular products for high temp

Stainless tubular products for high temperature applications are featured in 2-page data card.

Chemical composition, size ranges, and short-time high temperature tensile and rupture properties are included.

(Data Card TDC-195 is available from General Sales Office, Tubular Products Division of Babcock & Wilcox Co., Dept. P&PSE, Beaver Falls, Pennsylvania.)
Circle 9740 inside back cover.

Variable-speed pulleys data given

New variable-speed pulleys are designed to eliminate freezing and sticking. Technical data for five sheaves designed for ratings of 2 hp, 3 hp, 5 hp, 10 hp, and 15 hp are given in 12-page bulletin.

Power is transmitted from the stationary flange through a removable sleeve cap, which is keyed to the moving flange by torsionally resilient rubber keys. A continuous rotational pumping action assures a uniform, constantly renewed film of oil on the bearing surfaces.

(Bulletin No. 4101 is issued by T. B. Wood's Sons Co., Dept. P&PSE, Chambersburg, Pennsylvania.)
Circle 9741 inside back cover.

Bulletin describes fire hydrants

Line of fire hydrants are described in eight-page bulletin. Working parts can be removed for maintenance without excavation. Both hydrants feature O-ring construction.

The regular model hydrant has bolted joint construction. An improved safetop model with safety breakable section is also featured. Both conform to all AWWA specifications and are manufactured in 4, 4½ and 5 inch sizes with a wide variety of pipe end connections to meet every need.

(Bulletin 591 is available from Kennedy Valve Mfg. Co., Dept. P&PSE, Elmira, N.Y.)
Circle 9742 inside back cover.

How to get combustion safety

Four-page bulletin describes combustion safeguard control for heating and heat-treating applications.

Units provide continuous protection against fires or explosions from build-up of combustible fuel mixtures in either single or multi-burner installations.

Basic operating principle and design features are discussed.

(Bulletin No. 659 is issued by Protection Controls, Inc., Dept. P&PSE, 6000 N. Legett Ave., Chicago 46, Ill.)
Circle 9743 inside back cover.

All kinds of gearmotors

Design and construction features of gearmotors from ¼ to 100 hp are described in eight-page bulletin.

Covered in the bulletin are integral and all-motor types including right angle as well as special designs. All types are pictured and explained.

(Bulletin 51B9172 is available from Allis-Chalmers Manufacturing Company, Dept. P&PSE, Milwaukee 1, Wisconsin.)
Circle 9744 inside back cover.

Machine mounts control vibration

Machine mounts designed for vibration control and shock protection are illustrated with photographs and sketches in data sheet.

Application tables are also included.

(Machine Mounts Literature is available from Consolidated Kinetics Corporation, Dept. P&PSE, 1065 Dublin Road, Columbus 8, Ohio.)
Circle 9745 inside back cover.

Air dehumidifier for industry

Photographs and diagrams illustrate air dehumidifier that uses liquid absorbent for drying air to control its properties for industrial processing and product drying at low temperatures and the air conditioning of spaces for packaging and storage of moisture sensitive materials.

Included is a chart of dehumidifying capacities at various temperatures and cfm of air handled.

(Bulletin No. 140 is available from Niagara Blower Company, Dept. P&PSE, 405 Lexington Avenue, New York 17, New York.)
Circle 9746 inside back cover.

Catalog describes mica insulating material

Sixteen-page catalog lists various grades, forms, sizes, weights and specifications for bonded mica insulation. It gives complete information about properties, tolerances and composition of various grades than was previously available.

Types of backing and bonding materials are also treated. Fabricating helps, such as how to punch, saw, turn and drill this material, are also included.

(Catalog M 59 is available from Continental-Diamond Fibre Corp., Dept. P&PSE, Newark, Delaware.)
Circle 9747 inside back cover.

Automatic boiler water control system

Automatic side-stream boiler water control systems keep boiler water clear by eliminating sludge and suspended solids and combine side-stream filtration with chemical pretreatment, internal treatment, minimum blowdown, feedwater preheating and degassing all in one compact unit.

Six-page brochure shows how unit can save on fuel consumption, treatment chemicals, blowdown heat and water losses and contaminated condensate losses.

Features, installation photos, flow diagram, analysis tables, specifications, dimensions, capacities, controls are also featured.

("Automatic Side-Stream Boiler Water Control System," File No. 34-B-1 is issued by Sparkler-Filtrion Corp., Dept. P&PSE, North Chicago, Ill.)
Circle 9748 inside back cover.

Service entrance splice method shown

A three-step method enabling one man to install service entrance connections, without the use of tape or a "third hand," is described in 4-page bulletin.

Standard compression tools and "Insulink" connectors make electrically stable service entrance splices that are fully protected against moisture and accidental contact.

A cutaway drawing explains how the new pre-insulated connector is designed to save time and trouble in splicing copper and aluminum cables ranging from #10 through 1/0 str copper or aluminum and from #6 through #2 ACSR.

Bulletin reports results of immersion, salt spray and current cycling test to which the new connectors were subjected.

(Insulink Bulletin is available from Burndy Corporation, Dept. P&PSE, Norwalk, Connecticut.)
Circle 9749 inside back cover.

Lots of technical data on heat exchangers

Numerous charts and tables dealing with the design and application of standard line of heat exchangers are contained in 20-page bulletin.

The units are available in six types and in sizes to about 1200 sq ft of surface. A large stock of units allows immediate shipment for most requirements.

(Bulletin B-20 is issued by Struthers Wells Corporation, Dept. P&PSE, Warren, Pa.)
Circle 9750 inside back cover.

Gives expansion joint nomenclature

Bulletin gives information on the nomenclature and selection of expansion joints, and acts as a guide to making inquiries for specific applications.

The bulletin contains information on flanges, liners, covers, temperature ratings and other material of interest.

(Bulletin EJC-591 is issued by Expansion Joint Division of Badger Mfg. Company, Dept. P&PSE, 230 Bent Street, Cambridge 41, Mass.)
Circle 9751 inside back cover.

How to get protection of elect. equipment

Illustrated, 16-page catalog covers both application and construction features of line of time overcurrent relays used by industrial companies and utilities to protect electrical equipment.

Three different designs — inverse, very inverse, and extremely inverse — are featured. These are described thoroughly, with information included on how to determine the design of the relay for particular applications and how to calculate relay settings.

(Bulletin 5-050 is issued by Federal Pacific Electric Company, Dept. P&PSE, 50 Paris St., Newark 1, N.J.)
Circle 9752 inside back cover.

POWER PLANT & POWER SERVICES INDUSTRY

. . . has grown into

Plant and Power Services Engineer

LAST YEAR, we placed the words "Plant and Power Services" inside our magazine's name to tell you, our readers, that this magazine devotes its editorial efforts solely and completely to serving you key engineers responsible for these activities. . .

. . . whether you're in one of the many industries — no matter what or how many products your company makes — in utilities, in large public and private institutions, schools, hospitals, etc., or in a consulting capacity alone.

As an engineer responsible for these plant and power services, your scope of operation is not bound or limited by any one industry. The products and services needed to create and maintain the environment and provide the facilities necessary for effective operation of your particular industry are identical with — or closely related to — the products and services needed to run your neighbor's plant . . . or that plant on the other side of town . . . or that big utility nearby.

And . . .

. . . as you know, there is no logical separation of "plant services" and "power services." The responsibility of managing both come under your or your staff's single direction.

Because this magazine is for you, we have taken a major step toward identifying it with your job. That is why this magazine has grown into PLANT and POWER SERVICES ENGINEER!

— The Editors

A READER-ACTION MAGAZINE
published by

PUTMAN PUBLISHING COMPANY
111 E. Delaware Place
Chicago 11, Illinois

publishers of CHEMICAL PROCESSING • FOOD PROCESSING
FOOD BUSINESS • PLANT and POWER SERVICES ENGINEER

For handling mechanical misalignments

Line of flexible-cushion couplings ranging from fractional to 190 hp per 100 rpm accommodates angular misalignment, parallel misalignment and end float — singularly or in any combination.

Twelve-page bulletin gives detailed tables of horsepower ratings, dimensions and service factors for many applications. It also tells why no lubrication is needed and how the flexible element may be changed without removing flanges from shafts.

(Bulletin A669C is issued by Dodge Manufacturing Corporation, Dept. P&PSE, Mishawaka, Ind.)
Circle 9753 inside back cover.

Shows quick-connect hydraulic couplings

Features of quick connect-quick disconnect valved couplings for use with fuels and other fluids at working pressure to 3000 psi and temperatures to 400°F (in the ¼" size) are described in four-page bulletin.

Cutaway drawings, complete dimensional data and selections of end threadings for six sizes are given along with details on various accessory items.

(Catalog No. 280B is issued by Snap-Tite, Inc., Dept. P&PSE, Union City, Pa.)
Circle 9754 inside back cover.

Brushless generator

Characteristics of high-speed, packaged brushless synchronous generators in 40 to 300kw ratings are presented in four-page bulletin.

The units feature minimum maintenance, constant voltage, no sparking, and very low harmonic content under all load conditions.

(Bulletin 51B9192 is issued by Allis-Chalmers Manufacturing Company, Dept. P&-PSE, Milwaukee 1, Wis.)
Circle 9755 inside back cover.

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THAT'S INTERESTING

Atomic detectives

Tiny "atomic detectives" known as radioisotopes, are helping to unlock the secrets of nature according to Argonne National Laboratories, Lemont, Ill.

They are useful for solving a number of engineering problems such as those connected with performance of nuclear reactors and chemical behavior of fuel elements under operating conditions.

Used as tracers, the product emits tell-tale flashes of radioactivity wherever it goes, and does not alter significantly the physical or chemical properties of the materials being used.

In the engineering sciences "tracers" are used to study the chemical behavior of a number of radioactive products formed when uranium atoms split in nuclear reactors.

Light up and recharge

A full beam flashlight that throws an intensive beam for up to two hours of continuous use can be recharged overnight, according to Gulton Industries, Inc.

The flashlight, known as "Super 200", has two hermetically sealed, rechargable batteries, which never need replacing and which never leak or wear out, and a supercharging circuit in the base of the case.

To recharge, the flashlight is pulled apart, and the battery portion is plugged into any 110-volt, AC outlet, or the auto cigarette lighter. No matter how long it is left in, the flashlight cannot be overcharged.

It also contains a built-in lifetime permanent magnet that will hold it firmly against all metal surfaces.

3 PRESSURE CLASSES

1500-Pound ASA—in carbon steel (WCB)

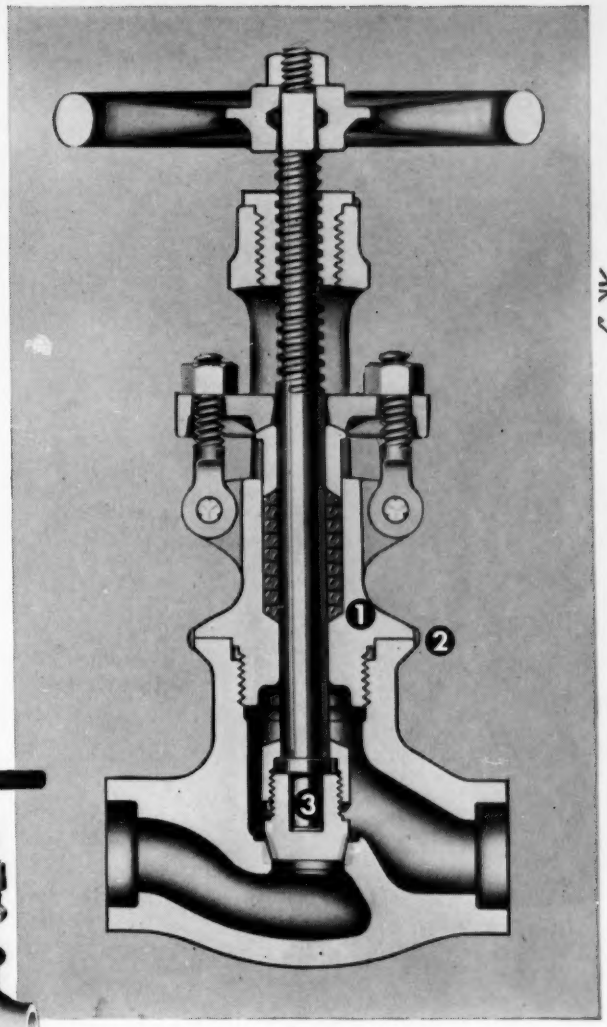
1570 psi, 1050 F (2500-Pound ASA)—in Crane No. 7 chrome-moly (WC6)

2520 psi, 1050 F—in Crane No. 7 chrome-moly (WC6)

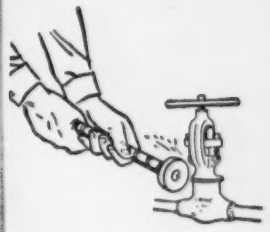
Globe, angle and lift-check patterns; sizes ½ to 2 in.; screwed and socket-welding ends. Check valves in 1500-Pound and 1570 psi ratings only.

ALL CRANE LIP-SEAL BONNET VALVES ARE ASA-RATED

Minimum metal thicknesses comply fully with the requirements of ASA B16.5-1957, as well as ASA Code for Pressure Piping and ASME Boiler and Pressure Vessel Code.



1 New centering shoulder assures perfect body-bonnet alignment. No chance of stem misalignment.



2 Welded body-bonnet Lip-Seal—eliminates bonnet joint maintenance. The seal-weld carries no mechanical load; it seals the bonnet joint only. Lip design permits convenient grind-off, easy rewelding.

3 Disc-stem connection. Improved design brings stem thrust closer to seating surface, minimizes vibration, does not interfere with swivel action of disc.

Today's ultimate in small high pressure valves —Crane Lip-Seal Bonnet Globes

These *accurately rated*, small high pressure valves—now in *three* pressure classes—meet all power plant service specifications for boiler feed, drips and drains, blowdowns, bypasses, and similar applications.

Here are compact yet rugged valves that provide precision throttling with minimum vibration of disc and reduced wear on seating faces—all with *low maintenance cost.*

The patented Lip-Seal bonnet alone gives these valves outstanding value. Strong, streamlined body . . . Stellite-faced, plug-type disc and seat . . . fully guided stem and disc . . . 2-piece, ball-type packing gland with stainless steel, swing-type eyebolts . . . these and more refinements all combine to make Crane Lip-Seal Bonnet Valves today's ultimate in their class.

For complete details, ask your Crane Representative for Bulletin AD-2373 or write to address below.

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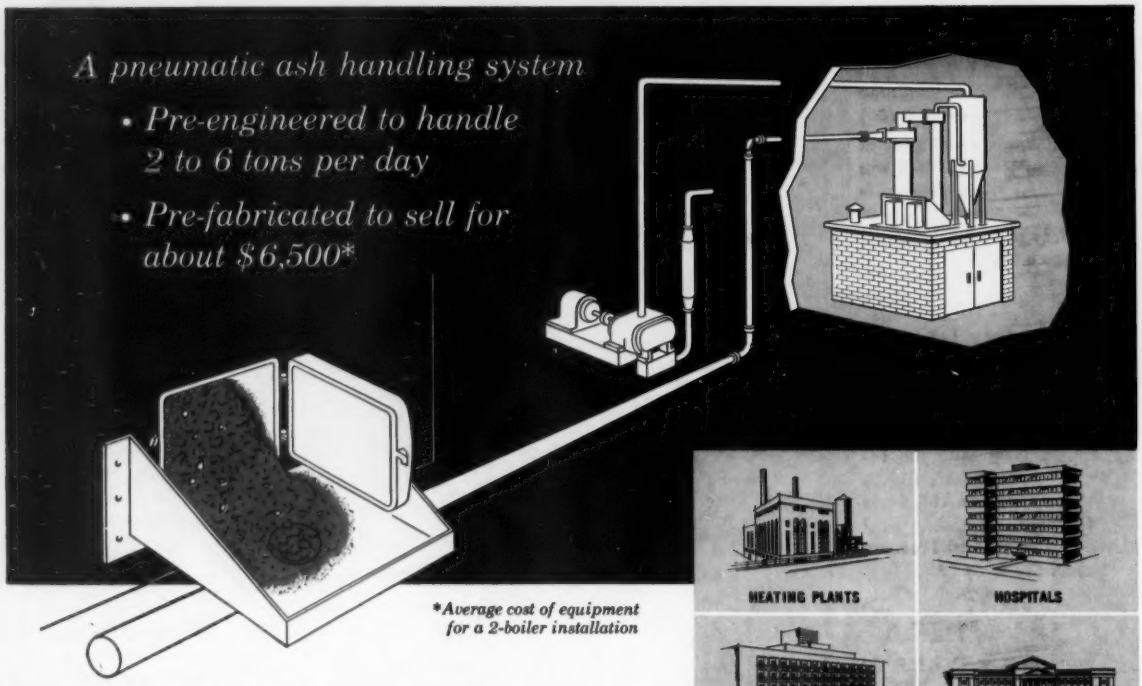
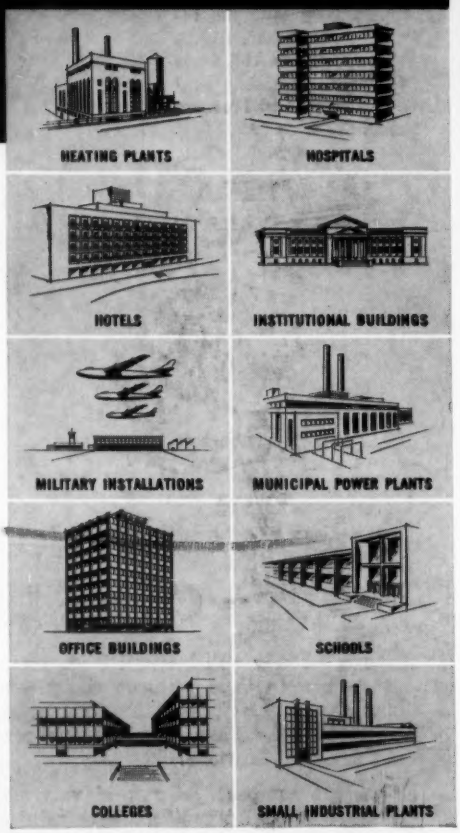
THE FIRST BIG BREAK IN ASH HANDLING COSTS
FOR THE SMALL COAL BURNING PLANT



**Average cost of equipment for a 2-boiler installation*



Engineers of small coal burning plants—Heating Plants, Hospitals, Hotels, Institutional Buildings, Military Installations, Municipal Power Plants, Office Buildings, Schools, Colleges, Small Industrial Plants—have long wished for a small, practical ash handling system that would eliminate much of the inconvenience, dust and constantly increasing labor costs of manual ash removal. Available ash removal systems could not be economically justified where less than 10 tons of ash per day was produced.

Aware of this need, The Allen-Sherman-Hoff Company assigned its best engineering talent to untangle the problem. The result: the *new* A-S-H ECONO-ASH System.

A major step in solving this problem was pre-engineering. Use proved designs of major components were re-engineered to handle smaller quantities; new equipment was designed and tested. One requirement was basic: cost reduction without loss of efficiency. Installation, for example, was made so simple that it can be made with local labor.

We've prepared a 4-page brochure to explain the *new* ECONO-ASH System—how it operates, its variations and its advantages. We'll send it to you immediately upon request. It also lists the A-S-H Sales Engineers—one is near you—who will be glad to show you how, in most installations, the *Econo-Ash will pay for itself in two years or less.*

MATERIALS HANDLING SYSTEMS

ASH

the **Allen-Sherman-Hoff** company

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